

Asthma in Maryland 2005



Prepared by the State of Maryland
Department of Health and Mental Hygiene
Family Health Administration
Maryland Asthma Control Program

MARYLAND ASTHMA SURVEILLANCE REPORT

2005

ACKNOWLEDGEMENTS

This fourth edition of the Maryland Asthma Surveillance Report could not have been completed without the assistance and support of many individuals and organizations. We owe special thanks to the people and organizations that provided data for this report, including DHMH colleagues in the Vital Statistics Administration, Maryland Medicaid, and the Center for Preventive Health Services. Key data was also provided by the Health Services Cost Review Commission (HSCRC), Dr. Lara Akinbami from the National Center for Health Statistics, and colleagues from the Maryland Health Care Commission, the West Virginia Health Care Authority, the Virginia Department of Health, the Pennsylvania Health Care Cost Containment Council, and the Delaware Department of Health. We greatly appreciate all of the work by Dr. Deanie Leonard, Julie Yang, and Dr. Alycia Steinberg from the Data Management & Analysis Division, Office of Planning & Finance, for their analysis of the Medicaid data. Helio Lopez from the DHMH Center for Preventive Health Services was, once again, instrumental in obtaining necessary data from the Behavioral Risk Factor Surveillance System (BRFSS). We also extend thanks to our manuscript editors, including Hal Sommers, and Dr. Isabelle Horon from the Vital Statistics Administration, as well as Helio Lopez. The American Lung Association of Maryland and the Asthma and Allergy Foundation of America, Maryland-Greater Washington, D.C. Chapter provided the photos for the report. Finally, special thanks are extended to the Centers for Disease Control and Prevention for direction and funding and to the staff of the Center for Maternal and Child Health, who edited and produced the final document.

Prepared by:

Wendy G. Lane, MD, MPH

Maureen C. Edwards, MD, MPH

To request a copy of this report, please visit our Web site at:

www.MarylandAsthmaControl.org.

For further information on this report, please contact:

Wendy G. Lane, MD, MPH
Asthma Epidemiologist
Maryland Asthma Control Program
410-767-6713



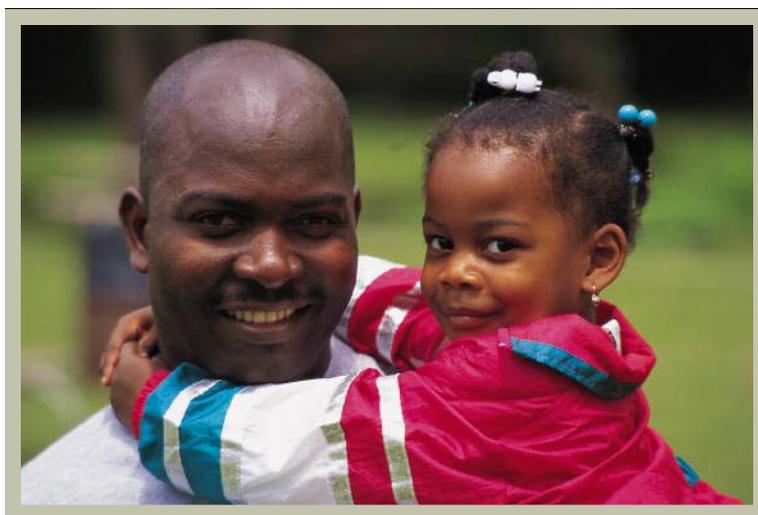
Photo Source: Allergy and Asthma Foundation of America
Maryland-Greater Washington, D.C.

TABLE OF CONTENTS

Acknowledgements	1
Main Findings	3
Introduction	4
Prevalence	5
Health Status of Maryland Asthmatics	8
Emergency Department Visits	12
Hospitalizations	14
Medicaid Enrollees and Asthma	16
Deaths	20
Disparities and Asthma	24
Asthma Among Maryland Hispanics	27
Maryland Jurisdictions and Asthma	29
Cost of Asthma	32
Conclusions	35
Future Directions	35
References	36
Appendix – 95% Confidence Intervals for BRFSS Data	38

MAIN FINDINGS

- ◆ Statewide, about 13.9% of Maryland adults and 10.2% of children have a history of asthma. About 7.8% of adults and 7.6% of children currently have asthma.
- ◆ Among Medicaid HealthChoice enrollees, 9.3% currently have asthma.
- ◆ In 2004, there were approximately 8,700 asthma hospitalizations and approximately 36,000 emergency department visits in Maryland for asthma.
- ◆ Asthma caused an average of 91 deaths per year in Maryland over the past 5 years.
- ◆ Many disparities can be seen in the morbidity and mortality from asthma. Persons at increased risk for asthma and its complications include the very young, the elderly, African-Americans, low-income individuals, and individuals in some jurisdictions, particularly Baltimore City.
- ◆ Maryland Hispanics generally have lower asthma prevalence rates and lower hospitalization rates than the Maryland population as a whole. However, Hispanics residing on the Eastern Shore have higher asthma hospitalization rates than the Eastern Shore population as a whole.
- ◆ In 2004, charges for hospitalizations due to asthma totaled nearly \$42 million. Charges for emergency department visits due to asthma totaled an additional \$21 million.
- ◆ Compared to those without asthma, adults with asthma perceive their general health less favorably than those without asthma. Asthma may interfere with all aspects of daily life, including work, sleep, and daily activities.



INTRODUCTION

Asthma is a chronic inflammatory disease of the small airways in the lungs. Asthma is characterized by recurring episodes of swelling and narrowing of the small airways in response to “triggers” such as upper respiratory infections, inhaled allergens, and irritants such as tobacco smoke. Symptoms during an asthma attack may include wheezing, cough, shortness of breath, and chest pain or tightness. Asthma affects both adults and children, and it is the most common chronic disease of childhood (Bloom, et al., 2003). In 2002, 12% of all U.S. children had been diagnosed with asthma during their lifetime, and 6% of all children had an asthma attack in the previous 12 months (CDC, National Health Interview Survey, 2002). Nearly 11% of U.S. adults have been diagnosed with asthma at some point during their lifetime, and 6.8% still have asthma (CDC, National Health Interview Survey, 2002). In 2002, asthma was responsible for 484,000 hospitalizations nationwide.

This is the fourth annual surveillance report of the Maryland Asthma Control Program (MACP). The MACP began in 2001, with funding by the Centers for Disease Control and Prevention (CDC) to develop a State Asthma Surveillance Program and Plan. In 2002, the Maryland State Legislature established the MACP in statute (General Article §§13-1701 through 13-1706, Annotated Code of Maryland). With the support of the Centers for Disease Control and Prevention (CDC), the Maryland Department of Health and Mental Hygiene (DHMH), and a legislative mandate, the MACP is ready to provide leadership in reducing the morbidity and mortality due to asthma in Maryland, particularly for its most vulnerable populations. Annual surveillance of asthma morbidity and mortality provides MACP with direction for the targeting of interventions, and it will ultimately serve as a key measure of MACP’s success.

Like the 2004 surveillance report, this report presents current data on asthma prevalence, mortality, and health care utilization, comparing state data to previous years, as well as to national data. This year’s report has been expanded to include more detailed information about asthma morbidity and mortality. A chapter has been added to address asthma among Maryland Hispanic residents. In addition, the chapter on health status of Maryland asthmatics has been expanded to include information about asthma and air pollution as well as influenza immunization among Maryland residents with asthma.

Data sources for this surveillance report include the CDC Behavioral Risk Factor Surveillance System (BRFSS), the Maryland Health Services Cost Review Commission (HSCRC), Maryland Medicaid encounter and claims data, and the Maryland Vital Statistics Administration. For BRFSS data, asthma is identified by report from the questionnaire respondents. For HSCRC data, asthma is identified by the use of International Classification of Disease, 9th Edition (ICD-9) codes. Asthma includes all codes from 493.0 to 493.9. For mortality data, asthma was identified through ICD-9 codes until 2001. ICD-10 codes of J45 to J46 are used for 2001-2004 mortality data. Rates are based on 2004 population statistics from the Vital Statistics Administration. Where possible, data have been age-adjusted to the 2000 U.S. estimated population in order to reliably compare populations with different age distributions.

PREVALENCE

Prevalence is the proportion of individuals who have asthma at a specific point in time. Lifetime prevalence is the proportion of individuals who have **ever** been diagnosed with asthma. Current prevalence refers to the proportion of individuals who still have a diagnosis of asthma at the time the question is asked.

As in previous years, asthma prevalence in Maryland was measured using the Behavioral Risk Factor Surveillance System (BRFSS), a statewide ongoing telephone survey of adults coordinated by the CDC and conducted in all 50 states. Each year, 4,900 Maryland residents are surveyed, and results are weighted in order to estimate responses for the entire state population.

The BRFSS survey includes questions about the respondents' lifetime and current asthma prevalence. Since 2001, the lifetime prevalence question has been "Have you ever been told by a doctor, nurse, or health professional that you had asthma?" Current prevalence is assessed by the question "Do you still have asthma?" The current prevalence question has been asked since 2000.

The BRFSS has contained questions about pediatric asthma prevalence since 2001. However, prior to 2003, only one question about lifetime asthma prevalence was included. Beginning in 2003, the survey began to include questions about both lifetime and current prevalence for children.

Lifetime asthma prevalence for Maryland residents more than 18 years of age was 13.9%, and current prevalence was 7.8% (Figures 1-1 and 1-2). Therefore, it is estimated that 578,692 Maryland adults have a history of asthma and 324,733 adults currently have asthma. Fifty-three percent of adult asthmatics in Maryland were diagnosed with asthma as children, with about 37% diagnosed with asthma before the age of 10 (Figure 1-3).

Figure 1-1

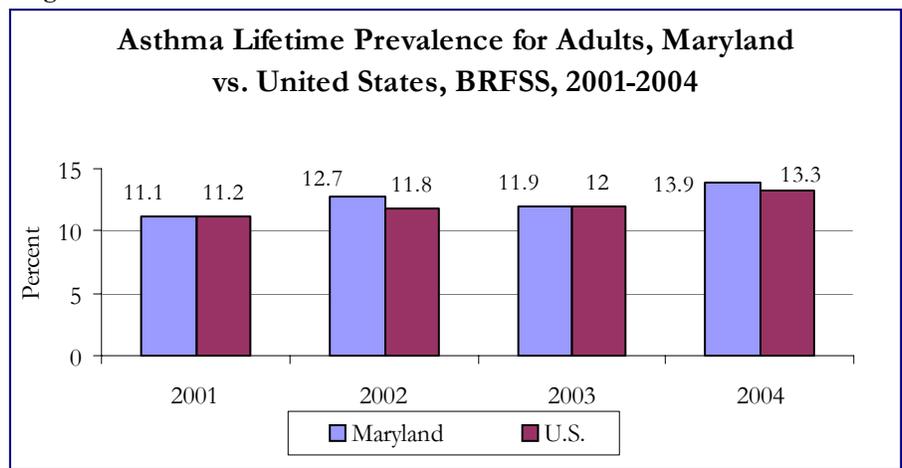
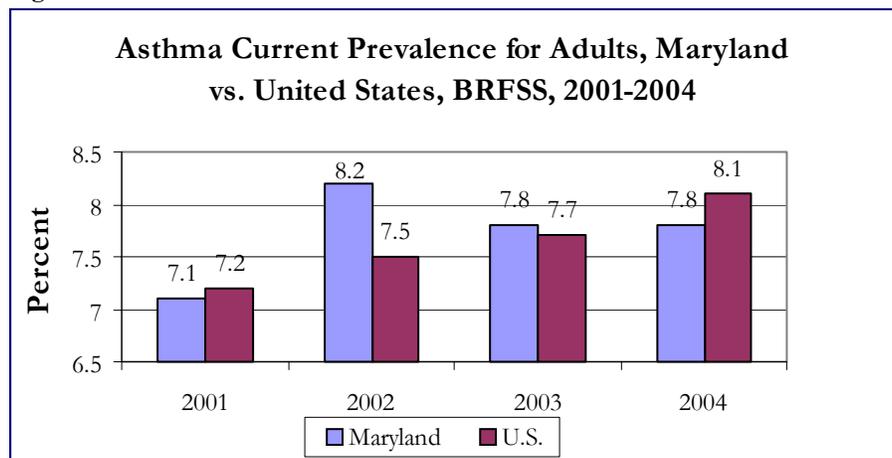


Figure 1-2



Continue —>

PREVALENCE—continued

Among those more than 18 years of age, African-Americans, women, and younger adults are disproportionately burdened by asthma, as are persons with low income. (Figures 1-4 through 1-8).

Figure 1-3

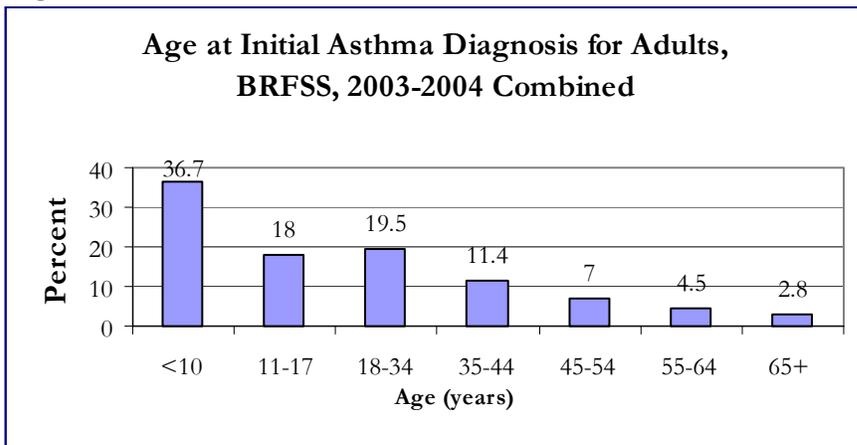


Figure 1-4

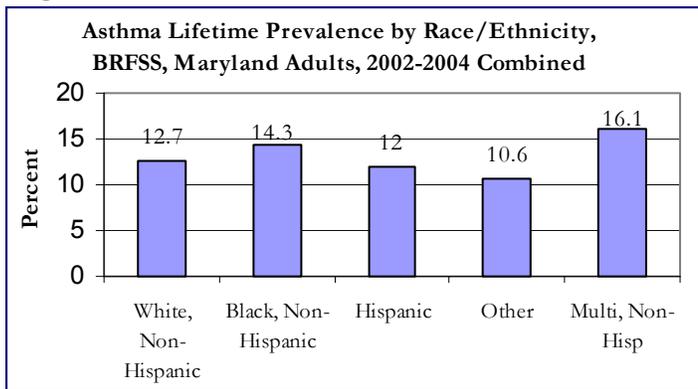


Figure 1-5

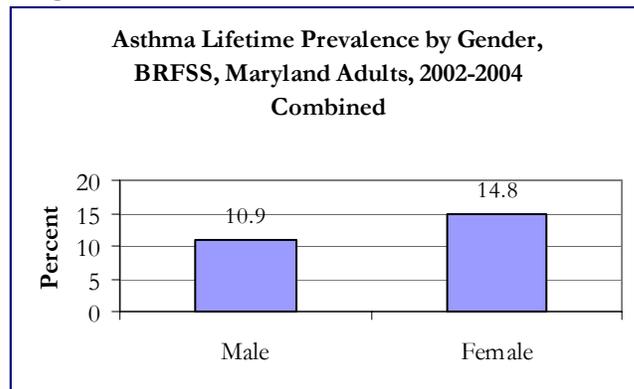
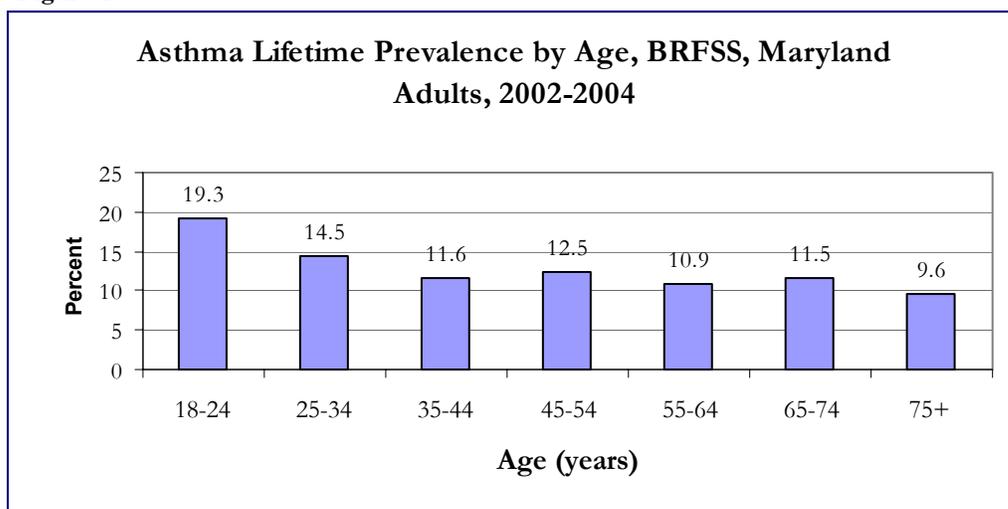


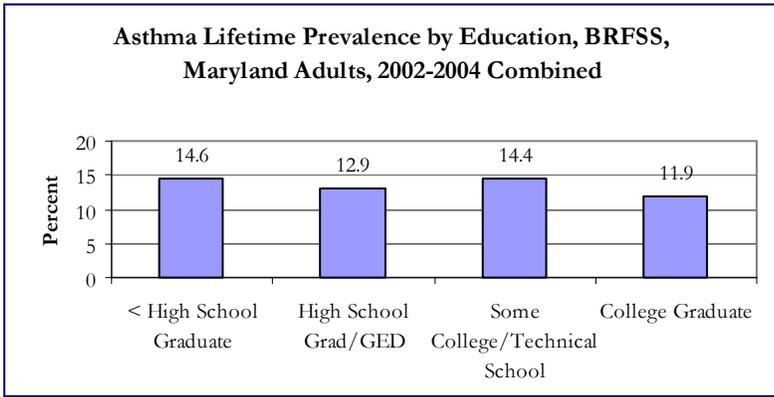
Figure 1-6



Continue —>

PREVALENCE—continued

Figure 1-7



Among Maryland children < 18 years of age, an estimated 142,270 have been diagnosed with asthma at some point during their lifetime, representing 10.2% of children. An estimated 106,000 children (7.6%) currently have asthma.

The prevalence of asthma among Maryland smokers is similar to that of former smokers and non-smokers (Figure 1-9). Maryland adults who currently have asthma are just as likely to smoke than those who have never had asthma (Figure 1-10). Because this data is cross-sectional, it is not possible to determine whether smoking caused or exacerbated asthma among Maryland adults. However, the high rates of smoking among Maryland asthmatics is concerning, and could be a target for further interventions.

Figure 1-8

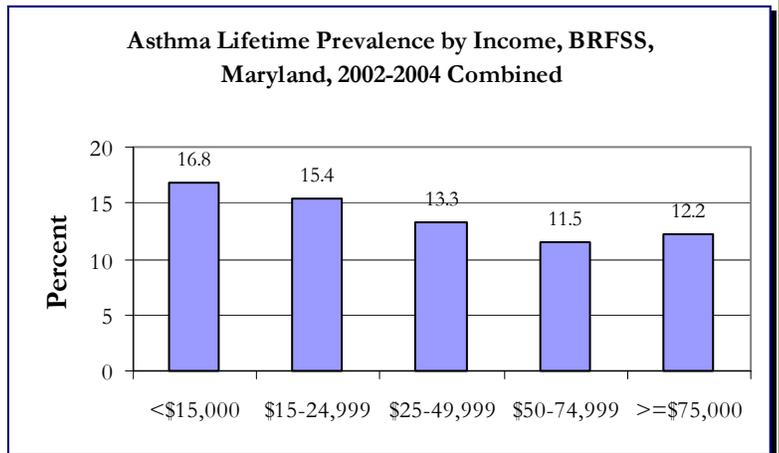


Figure 1-9

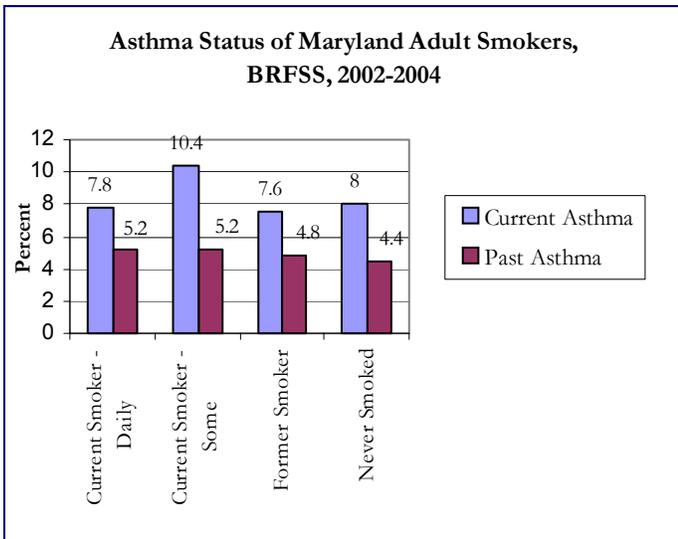
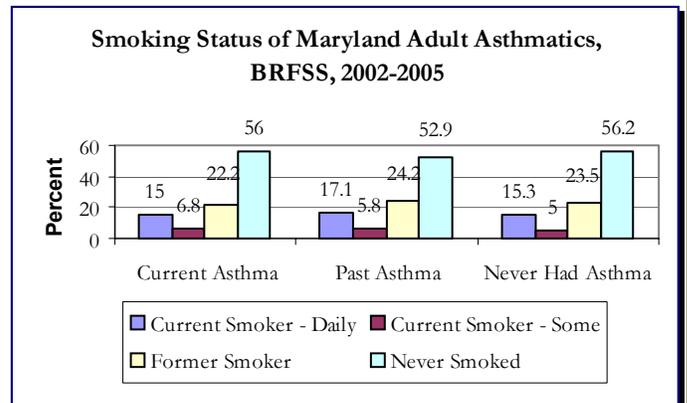


Figure 1-10



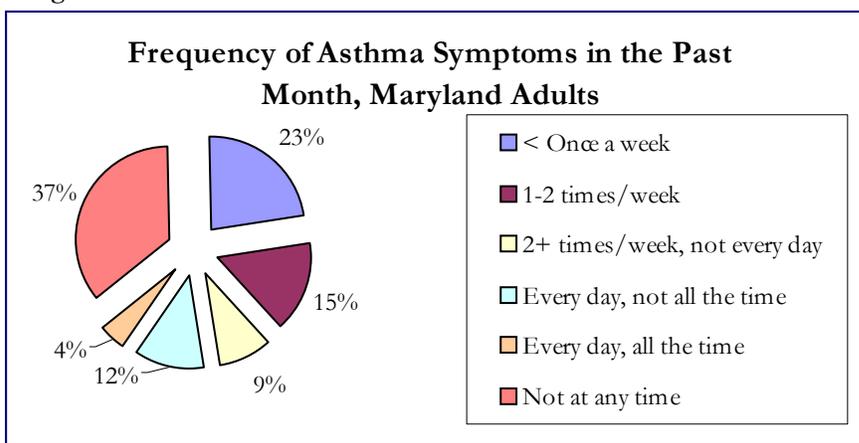
HEALTH STATUS OF MARYLAND ASTHMATICS

Asthma symptoms can have a deleterious effect on quality of life for those who suffer from this disease. The 2003 and 2004 Maryland BRFSS questionnaires included an additional adult asthma module that elicited information about asthma symptoms and medical care for those symptoms. These adult asthma module questions were asked of all respondents who answered yes to the question, “Have you ever been told by a doctor, nurse, or other health professional that you had asthma?” About 300 people answered each of these questions each year, and the results were weighted to reflect statewide demographics. Data from the 2003 and 2004 BRFSS surveys were combined in order to increase the total number of respondents, and decrease the range of error. However, the number of respondents was low, even after combining two years of data. Therefore, data presented below represent estimates of actual symptom rates.

BRFSS data indicate that among Maryland adults with asthma, only 37% were symptom free during the past month (Figure 2-1). Sixteen percent of adults had symptoms every day. Nearly half of adult asthmatics had difficulty sleeping during the past month as a result of their asthma (Figure 2-2). Daily use of asthma medication during the previous month was reported by 36% of BRFSS respondents with asthma (Figure 2-3). The wording of this question did not distinguish between daily use of controller medication vs. rescue medication.

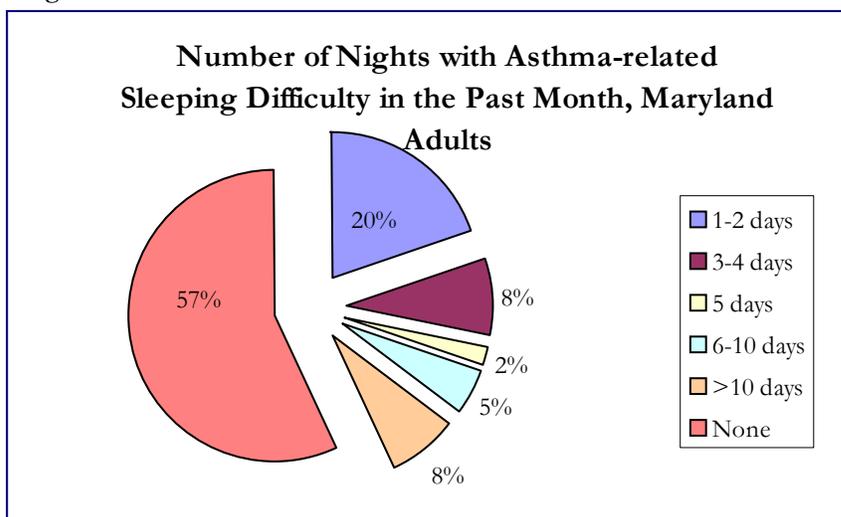
Asthma symptoms made it difficult for many BRFSS respondents to attend work and participate in their normal activities. Thirty-four percent of Maryland adults with asthma had symptoms in the past year that interfered with their work or usual activities (Figure 2-4). Twelve percent of Maryland adults with asthma had at least 30 days of asthma symptoms in the past year that interfered with their work or usual activities. In general, Maryland adults with asthma consider their health to be worse than those without asthma. While only 10.7% of adult Maryland residents without asthma rated their health as fair or poor, 25% of those with asthma did so (Figure 2-5).

Figure 2-1



Data from 2003-2004 BRFSS

Figure 2-2

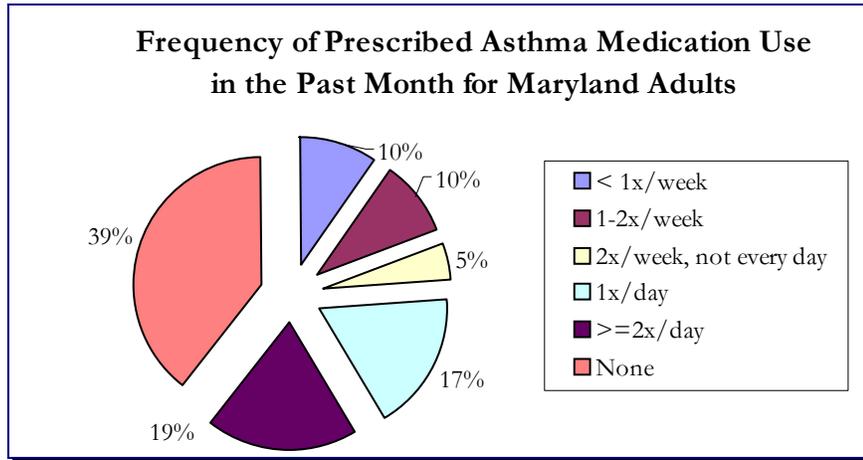


Data from 2003-2004 BRFSS

Continue —>

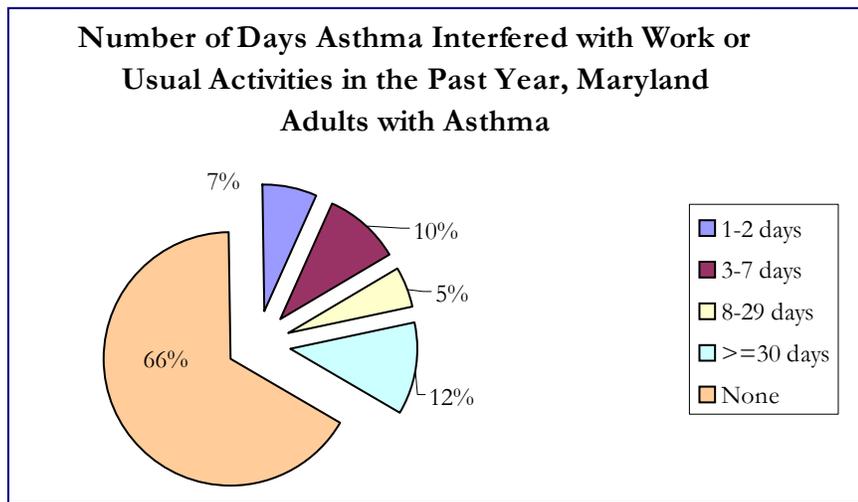
HEALTH STATUS OF MARYLAND ASTHMATICS—Continued

Figure 2-3



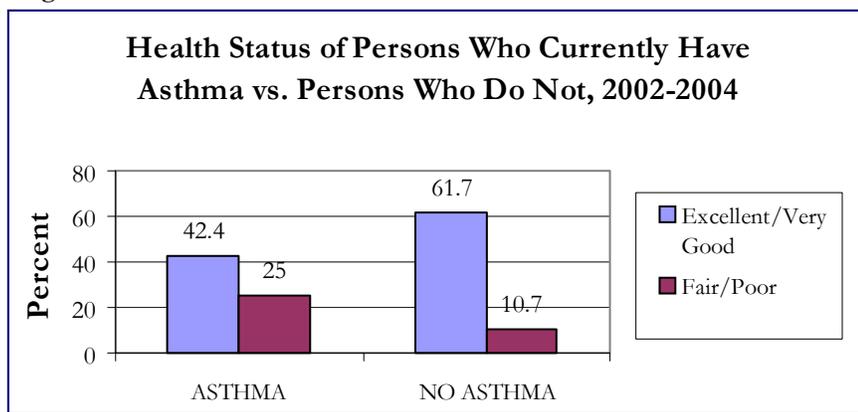
Data from 2003-2004 BRFSS

Figure 2-4



Data from 2003-004 BRFSS

Figure 2-5



Data from 2003-2004 BRFSS

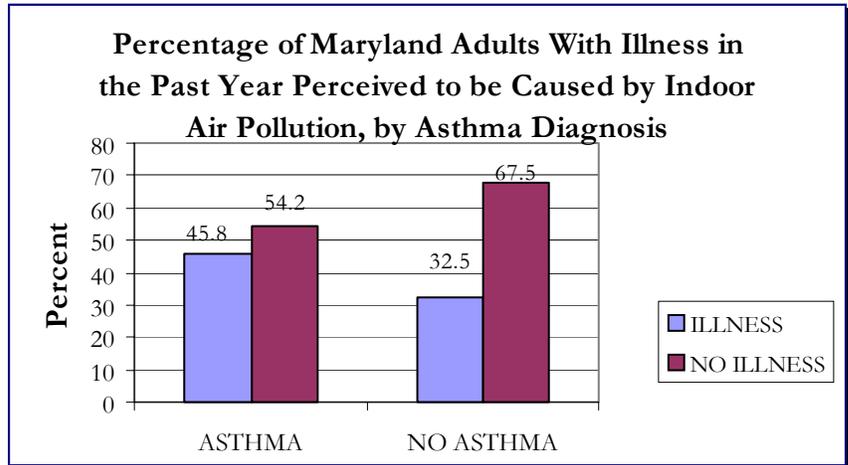
Continue —>

HEALTH STATUS OF MARYLAND ASTHMATICS—Continued

A diagnosis of asthma did increase the likelihood of influenza immunization among Maryland adults. For Maryland adults with a current diagnosis of asthma, 46% were vaccinated against influenza in 2004. However, only 33% of adults without a current diagnosis of asthma were immunized. (Figure 2-10).

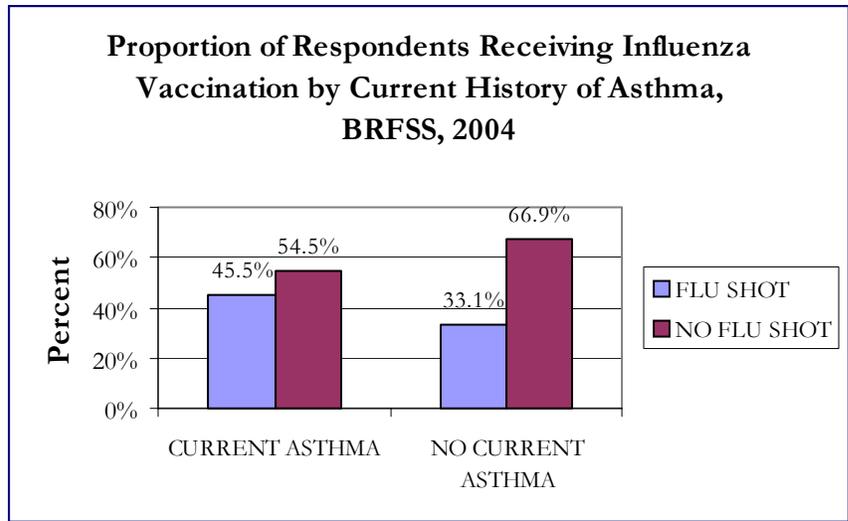
Influenza vaccination was also assessed among adults who had been diagnosed with asthma at any point in their lives (Lifetime prevalence). 41.5% of adults with a lifetime history of asthma received influenza vaccine in 2004. Of all respondents receiving influenza vaccine, 10.5% had a current history of asthma, while 89.5% did not have a current history of asthma.

Figure 2-9

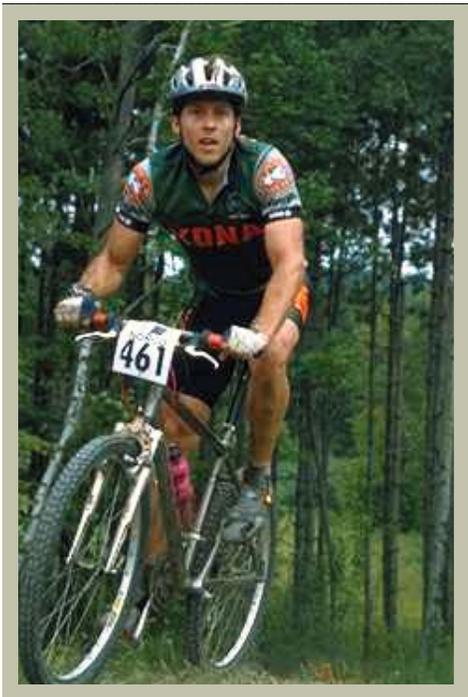


Data from 2004 BRFSS

Figure 2-10



Data from 2004 BRFSS

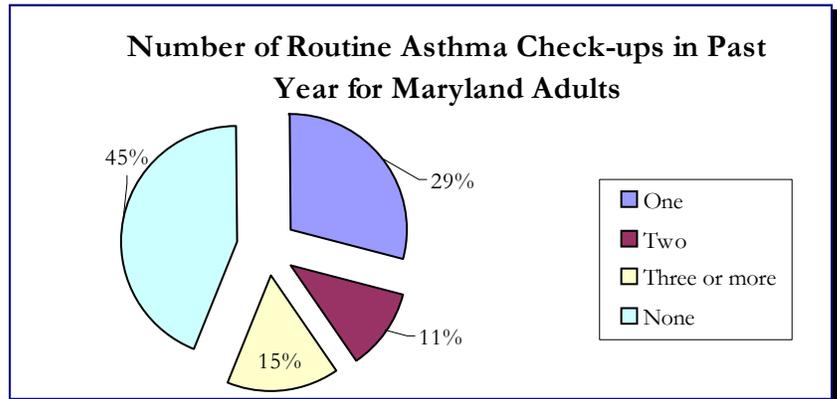


HEALTH STATUS OF MARYLAND ASTHMATICS—Continued

Nearly half (45%) of Maryland adults with asthma received no routine check-ups for their illness in the year prior to the BRFSS survey (Figure 2-6). Twenty-five percent of Maryland asthmatics saw a doctor at least once during the past year for urgent or worsening asthma symptoms (Figure 2-7).

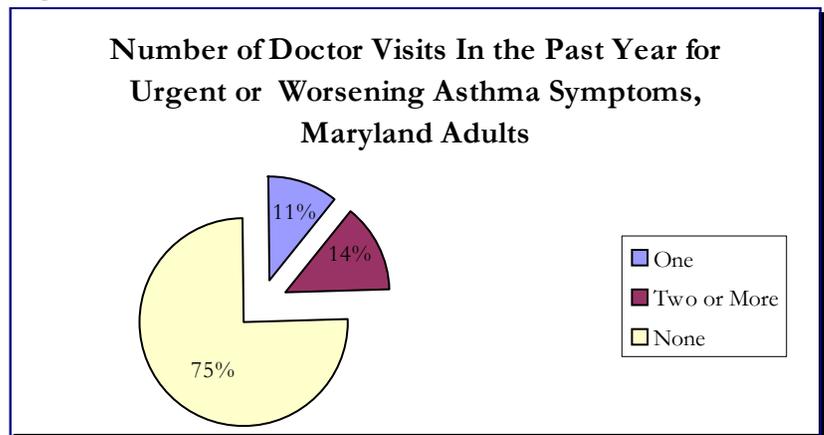
Questions about indoor and outdoor air pollution were included for the first time in the 2004 BRFSS survey. The specific questions were as follows: “In the past 12 months, did you have an illness that you think was caused by pollution in the air outdoors?” and “In the past 12 months, did you have an illness that you think was caused by the air inside a home, office, or other building?” Maryland asthmatics were more likely than non-asthmatics to respond that they had become ill from indoor and outdoor air pollution (Figures 2-8 & 2-9). For example, 31.1% of Maryland asthmatics believed that they had an illness caused by outdoor air pollution in 2004, while only 17.4% of non-asthmatics believed that they had such an illness. Similarly, while 45.8% of Maryland asthmatics believed that they had an illness caused by indoor air pollution in 2004, only 32.5% of non-asthmatics believed that they had such an illness.

Figure 2-6



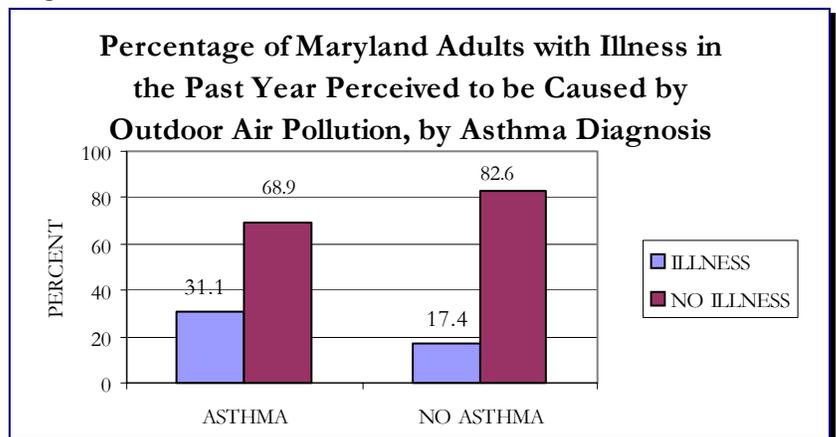
Data from 2003-2004 BRFSS

Figure 2-7



Data from 2003-2004 BRFSS

Figure 2-8



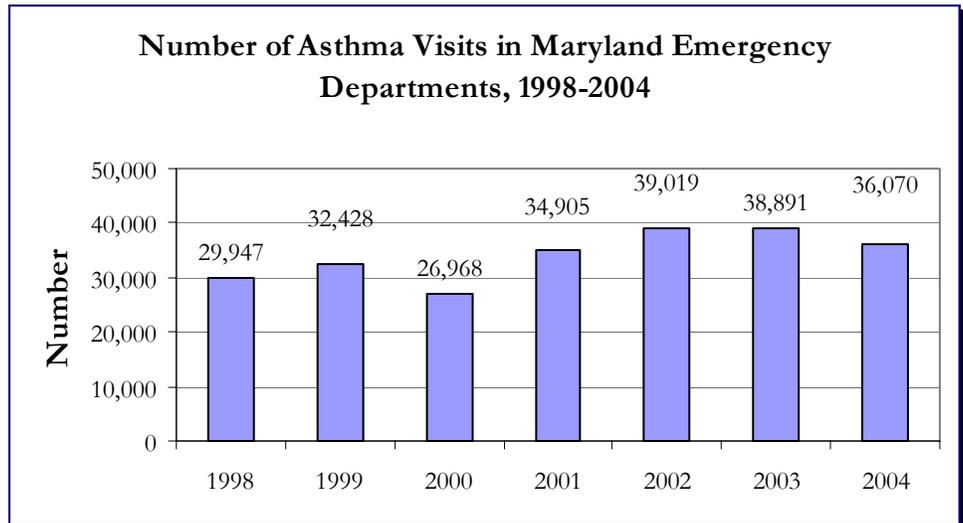
Data from 2004 BRFSS

EMERGENCY DEPARTMENT VISITS

Individuals with asthma can usually manage their condition through the avoidance of triggers, appropriate use of medications, and health care by their primary care providers with specialty consultation as needed. Emergency department visits occur when persons with asthma develop symptoms that cannot be managed at home, or they lack access to treatment by a primary care provider.

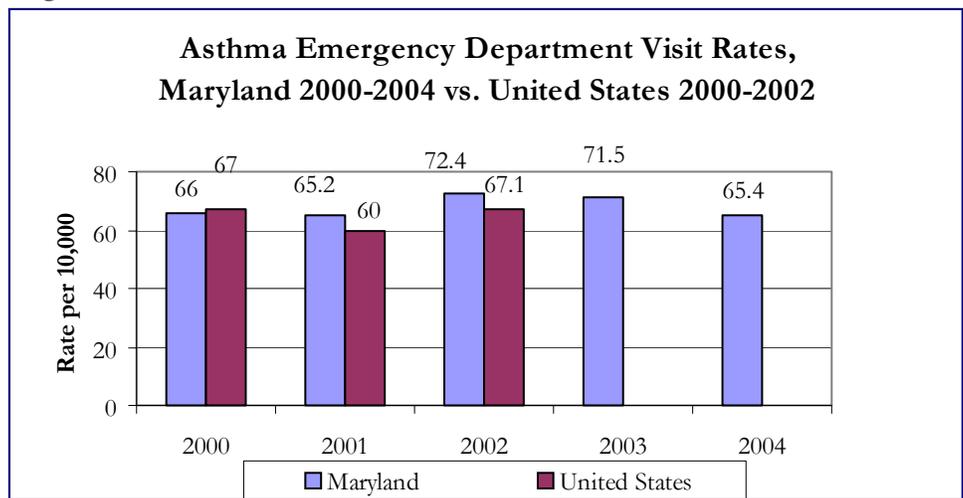
Information regarding emergency department visits for asthma has been abstracted from the Maryland Health Services Cost Review Commission (HSCRC) ambulatory care file. Data are collected only for non-federal hospitals within Maryland, and are available from April of 1997. In 2004, there were 36,070 emergency department visits for asthma (Figure 3-1). This represents a rate of 65.4 emergency departments per 10,000 population in 2004 (Figure 3-2). The total number of visits and the rate of ED visits for 2004 are lower than those seen in 2003. Data abstraction methods changed somewhat after the 2001 analyses were performed. Therefore, the increase in hospitalizations between 2001 and 2002 may be attributable to changes in these data abstraction methods. The method of data abstraction has been consistent for years 2002-2004. Maryland emergency department visit rates are now lower than the 2002 national rate of 67.1 visits per 10,000 population (Figure 3-2).

Figure 3-1



Data from HSCRC

Figure 3-2



Maryland data from HSCRC.

United States data from National Center for Health Statistics (NCHS)

All rates are age adjusted to the 2000 U.S. estimated population.

Continue —>

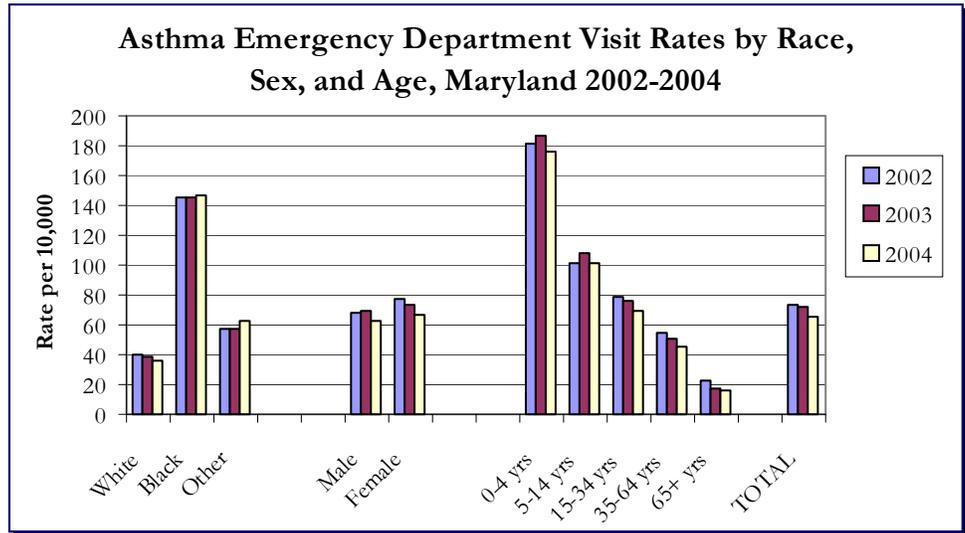
EMERGENCY DEPARTMENT VISITS - Continued

Emergency department visit rates have decreased for both genders and all age groups. However, visit rates for African-Americans increased from last year (Figure 3-3). African-Americans in Maryland visit the emergency department for asthma at four times the rate of Whites. Young children are brought to the emergency department for asthma more often than adults. Disparities in gender persist, but have narrowed since 2002.

Maryland emergency department visit rates have shown a downward trend from 2002 to 2004. However, rates continue to exceed the Healthy People 2010 goals for all age groups (Figure 3-4). This difference remains most dramatic for children under 5 years of age. While the Healthy People 2010 goal is 80 visits per 10,000 population, Maryland's youngest children (age 0-4) had 186.1 visits per 10,000 population.

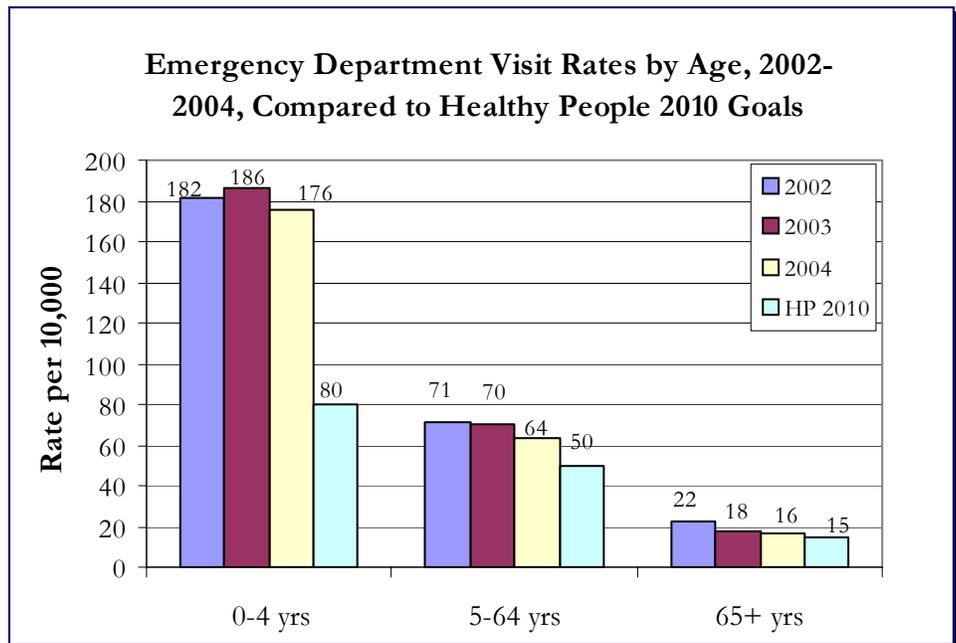
Many emergency department visits are avoidable with appropriate preventive and therapeutic care. Guidelines on asthma management are available from the National Heart, Lung, and Blood Institute of the National Institutes of Health (<http://www.nhlpi.nih.gov/guidelines/asthma/asthgdln.htm>). These guidelines can assist patients and providers in working together to establish an optimal asthma control regimen and to assure adherence to this regimen.

Figure 3-3



Data for total population, and by race and sex are age adjusted to the 2000 U.S. estimated population.

Figure 3-4



Data for age groups 5-64 and 65+ years are age adjusted to the 2000 U.S. estimated population.

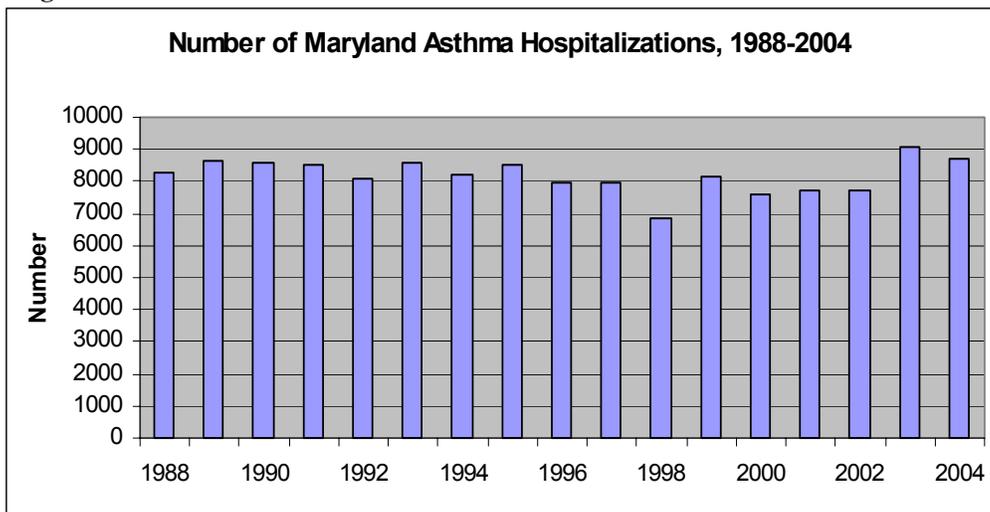
HOSPITALIZATIONS

Hospitalization for asthma is generally considered a failure of outpatient management. Maryland hospitalization data from 1988-2004 were obtained from the Maryland Health Services Cost Review Commission (HSCRC). Because some Maryland residents are hospitalized in neighboring states, information from Maryland hospitals has been supplemented with data from the District of Columbia, West Virginia, Virginia, Pennsylvania, and Delaware, when possible.

In Maryland hospitals, the number and rate of hospitalizations for asthma as a primary diagnosis decreased from 2003, but remained higher than 2002 rates. There were 8,681 asthma hospitalizations in 2004, compared to 9,065 in 2003 and 7,695 in 2002 (Figure 4-1). These counts include Maryland hospitals only. An additional 561 Maryland residents were hospitalized for asthma in neighboring states/ jurisdictions. The majority of these Maryland residents were hospitalized in the District of Columbia (466), with 33 hospitalized in Virginia, 7 in West Virginia, 21 in Pennsylvania, and 34 in Delaware.

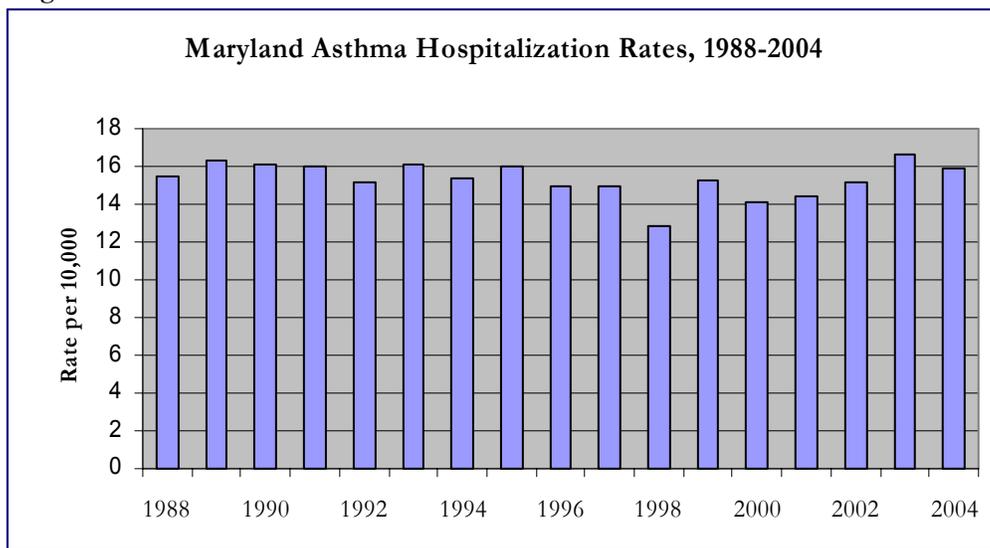
The hospitalization rate for Maryland residents was 15.6 per 10,000 population without including those hospitalizations outside of Maryland, or 16.8 per 10,000 population when hospitalizations outside of Maryland are included (Figure 4-2). These rates are lower than that for the United States as a whole, which was, on average, 17.6 hospitalizations per 10,000 between 1999 and 2003. Hospitalization rates for African-Americans in 2004

Figure 4-1



Data from HSCRC for Maryland residents hospitalized in Maryland hospitals. For 1988-2001, hospitalizations/year were determined by admission date. For 2002-2004, hospitalizations/year were determined by discharge date.

Figure 4-2



Data from HSCRC for Maryland residents hospitalized in Maryland hospitals. For 1988-2001, hospitalizations/year were determined by admission date. For 2002-2004, hospitalizations/year determined by discharge date. All rates are age adjusted to the 2000 U.S. estimated population.

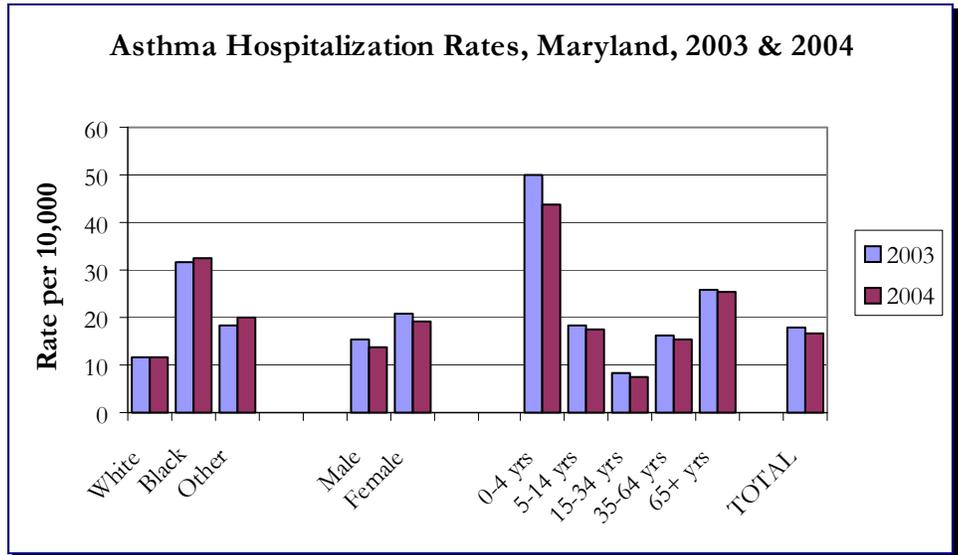
Continue —>

HOSPITALIZATIONS - Continued

continued to be nearly three times that of Whites (Figure 4-3). Females continue to have higher hospitalization rates than males, and children under 5 continue to have the highest hospitalization rates compared to other age groups, with a rate of 43.9 per 10,000. Hospitalization rates for all age groups continue to exceed Healthy People 2010 goals (Figure 4-4).

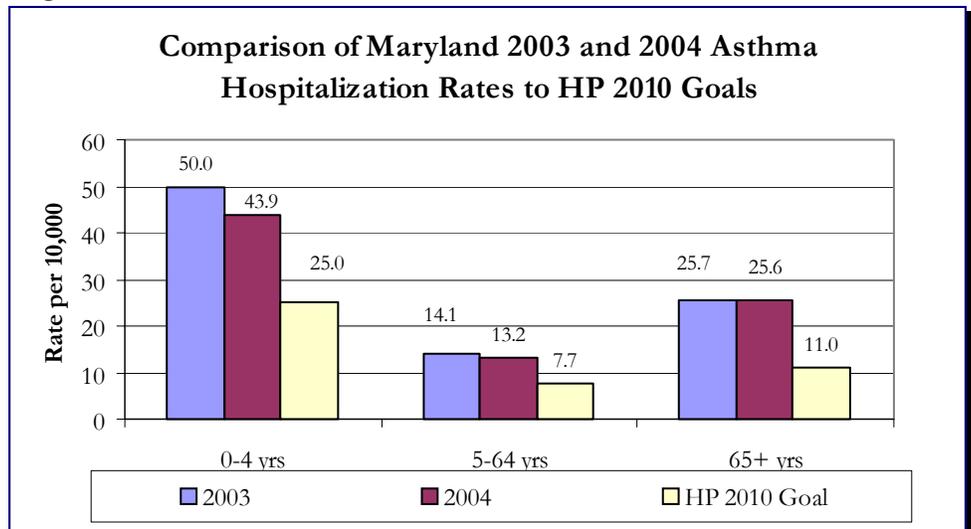
Maryland residents hospitalized for asthma spent an average of 2.9 days in the hospital (median of 2 days). The length of hospitalization increases with age. While children under age five spent an average of 2.0 days in the hospital, adults age 65 and older spent, on average, 4.3 days in the hospital for asthma.

Figure 4-3



Maryland hospitalization data from HSCRC
 Total hospitalization rate and hospitalization rates by race and sex are age adjusted to the 2000 U.S. estimated population.
 Hospitalizations of Maryland residents in West Virginia are included in all data except rates by race, because West Virginia does not collect data on race.
 Hospitalizations of Maryland residents in the District of Columbia, Virginia, Pennsylvania, and Delaware are included in all data

Figure 4-4



Data for age groups 5-64 and 65+ years are age adjusted to the 2000 U.S. estimated population.
 Hospitalizations of Maryland residents in D.C., West Virginia, Virginia, Pennsylvania, and Delaware are included in 2003 & 2004 data.



MEDICAID (HealthChoice) ENROLLEES AND ASTHMA

Medicaid is a joint federal/state funded program that provides health care coverage to lower income children and adults. HealthChoice is Maryland Medicaid’s managed care program. In 2004 HealthChoice enrolled approximately 70% of Medicaid beneficiaries (over 483,000 Marylanders). HealthChoice enrollees include low-income children, pregnant women, families receiving Temporary Cash Assistance (TCA), individuals receiving Supplemental Security Income (SSI) benefits, and children in foster care. Some of the groups excluded from HealthChoice are Medicare recipients, individuals who are eligible for Medicaid under a spend-down category, and individuals in nursing facilities for more than 30 days.

Individuals in HealthChoice enroll in one of seven managed care organizations (MCOs). HealthChoice enrollees receive most of their health care services from their MCOs, except for certain services that are provided on a fee-for-service basis.

Maryland Medicaid collects MCO encounter data for a variety of purposes including program administration and evaluation, and MCO rate-setting. In this report, encounter data were analyzed to estimate asthma prevalence among HealthChoice enrollees. Encounter data for calendar years 2003 and 2004 were analyzed for patient demographics, asthma prevalence, and utilization of outpatient care, emergency department visits, and hospitalizations.

The Medicaid data presented here are restricted to MCO encounter data. This is a change from last year’s asthma report, which included fee-for-service data. Limiting the data to MCO encounter data focuses on individuals who have a complete Medicaid benefit (as opposed to those who receive many of their services from Medicare) and allows for comparison with other analyses of HealthChoice data.

Asthma Prevalence

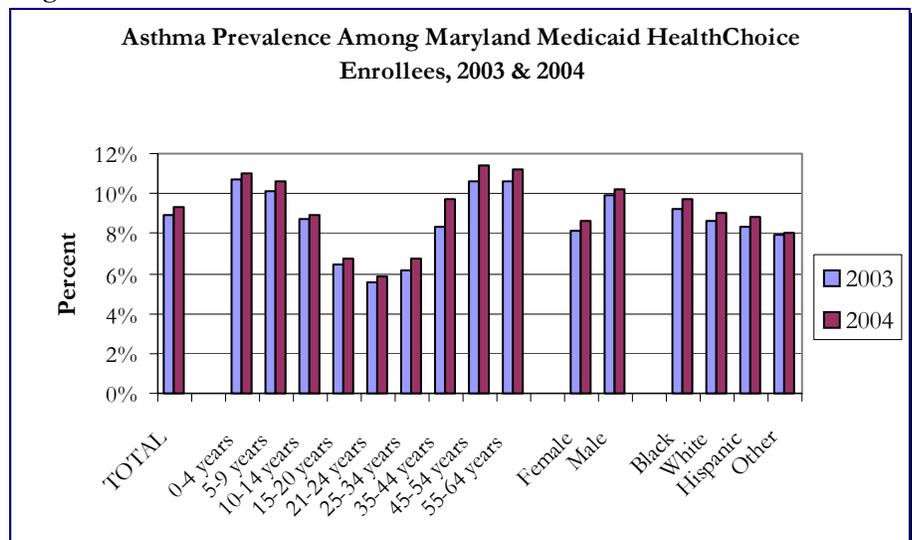
Prevalence was defined as the percent of HealthChoice enrollees with any period of MCO enrollment having **at least one encounter with a diagnosis of asthma during the year**. This could include visits for asthma as the primary diagnosis or any of the next three diagnoses listed for the encounter.

This contrasts with hospitalization and emergency department visit data from the Health Services Cost Review Commission (HSCRC). HSCRC data show the number of emergency department visits or hospitalizations, not the percent of individuals with emergency department visits or hospitalizations. This is because HSCRC data are not unduplicated; one individual with two visits would be counted twice.

In 2004, 56,948 HealthChoice enrollees had encounters that indicated a diagnosis of asthma.

Asthma prevalence for all HealthChoice enrollees in 2004 was 9.3%, up from 8.8% in 2003 (Figure 5-1).

Figure 5-1



Source: Maryland Medicaid

Continue —>

MEDICAID (HealthChoice) ENROLLEES AND ASTHMA - Continued

The year-to-year comparison shows increases across all age groups. Asthma prevalence rates were higher for Blacks than for Whites or Hispanics, and higher for males than females. Asthma prevalence is high among the youngest children, decreases in older children and young adults, and then rises again in older adults.

Comparison by age and gender show higher rates among male children ages 0-4, 5-9, and 10-14 years (Figure 5-2). From the late teen years through age 64, however, females have a higher prevalence of asthma than males.

Outpatient Visits

Among those who met the definition of having asthma, about half had an outpatient visit that included a diagnosis of asthma during the year (Figure 5-3). Young children were more likely to have outpatient visits, with 55-61% of children age 0-14 years having at least one outpatient visit. Children in these age groups had an average of 1.1-1.2 outpatient asthma visit per child per year. Rates decreased with increasing age up to age 24 and then began to increase. Rates were higher for Hispanics than other racial or ethnic groups. Rates were higher for men than women.

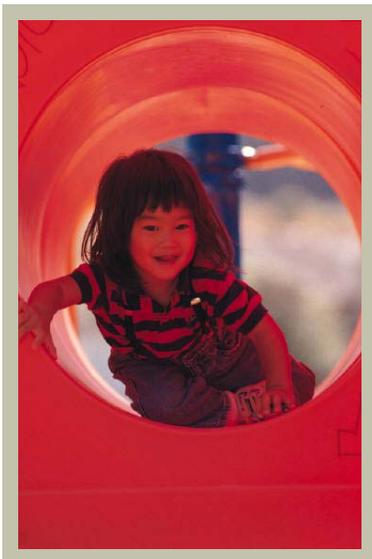
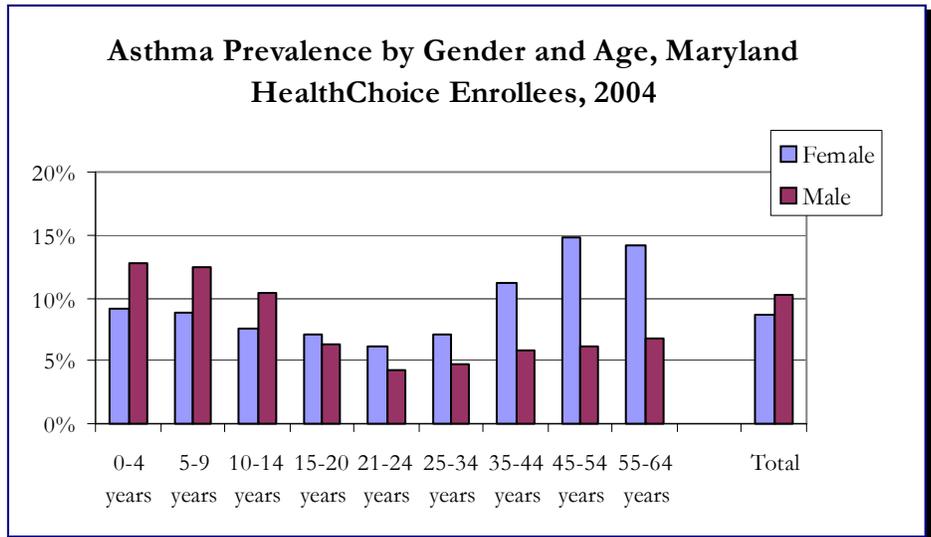
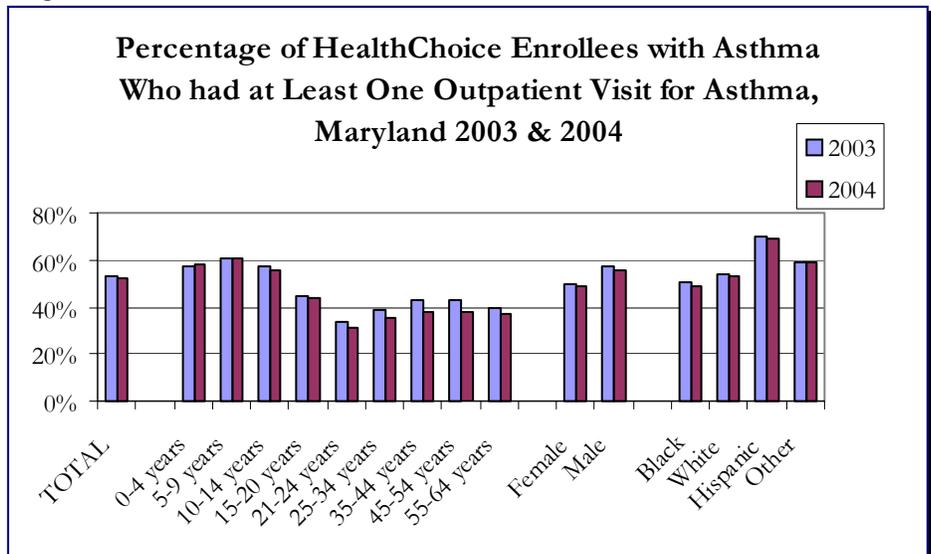


Figure 5-2



Source: Maryland Medicaid

Figure 5-3



Source: Maryland Medicaid

Continue —>

MEDICAID (HealthChoice) ENROLLEES AND ASTHMA - Continued

The implications of these data are unclear for several different reasons. Individuals may have had additional outpatient visits which did not include a diagnosis of asthma; these visits are not counted here. For example, asthma may be addressed during a well-child visit, but not coded as such. In addition, these data did not define a minimum period of continuous MCO enrollment. This means the data would capture individuals who are new to the HealthChoice program or who were in HealthChoice for short periods of time. Lastly, the level of asthma acuity was not determined.

Emergency Department Use

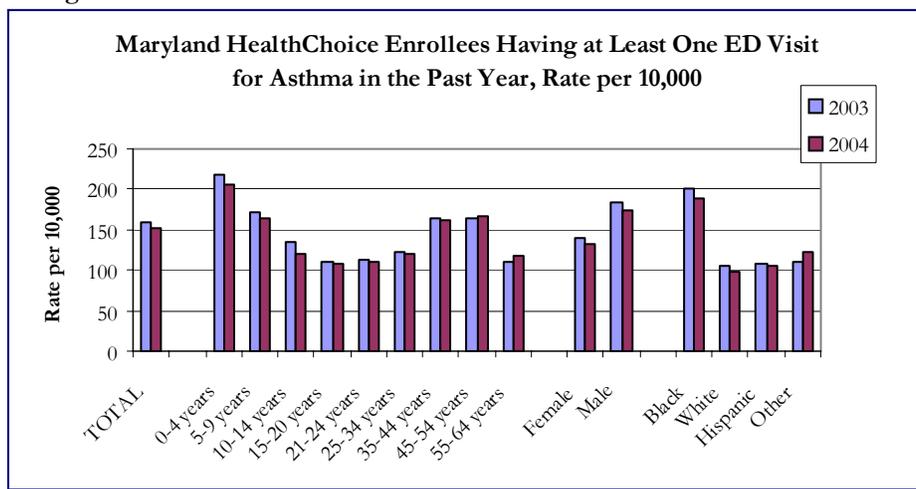
In 2004 about 151 per 10,000 HealthChoice enrollees had emergency department encounters that indicated an asthma diagnosis (Figure 5-4). Previous analyses have found that while emergency department use increased in the early years of HealthChoice, it has remained relatively static since 2001¹. Levels of emergency department use among the HealthChoice population may be indicative of a number of issues, including:

- Increased emergency department use in Maryland and the United States as a whole.
- Increased service availability due to expansions of hospital emergency departments and outpatient facilities and accompanying community outreach.
- 24 hour availability of emergency departments.
- Lack of financial disincentives for Medicaid recipients to use emergency departments².

Emergency department visits that indicated a diagnosis of asthma were highest for HealthChoice enrollees age 0-4 years with a rate of 206 enrollees per 10,000. Rates were higher for Blacks than for Whites or Hispanics.

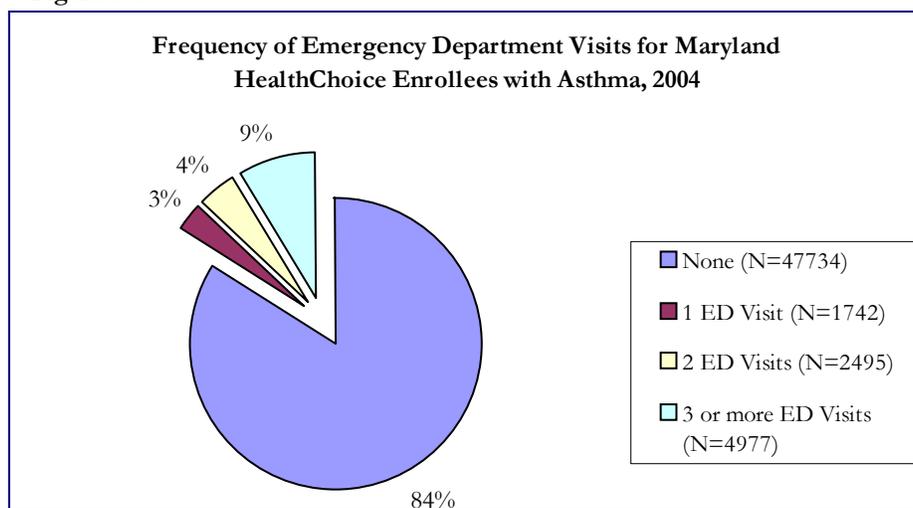
Most Medicaid enrollees with a diagnosis of asthma (47,734 or 84%) required no emergency department visits in 2004. Three percent had one emergency department visit, 4% had two visits, and 9% had three or more visits in 2004 (Figure 5-5).

Figure 5-4



Source: Maryland Medicaid

Figure 5-5



Source: Maryland Medicaid

¹2006 HealthChoice Evaluation. Available at: http://www.dhmh.state.md.us/mma/healthchoice/pdf/FINAL_HCEval2006.pdf

²2005 HealthChoice Evaluation. Available at: <http://www.dhmh.state.md.us/mma/pdf/HC%20Eval%20Final%202005.pdf>

MEDICAID (HealthChoice) ENROLLEES AND ASTHMA - Continued

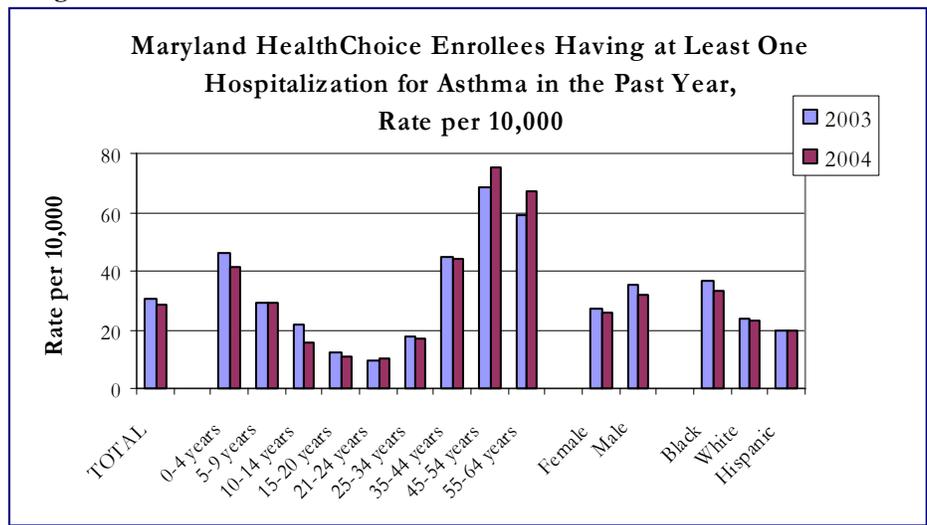
Hospitalizations

The 2004 rate of hospitalization for asthma was 28.7 per 10,000 HealthChoice enrollees (Figure 5-6). For children, the hospitalization rate varied by age. Hospitalizations were highest for those age 0-4 years (41.6 hospitalizations per 10,000 enrollees). Among adults, hospitalization rates were highest for those age 55-64 years (67.4 hospitalizations per 10,000 enrollees). Rates were higher for Blacks than any other racial or ethnic group.

Previous analyses of avoidable asthma inpatient admission rates found that the rates of asthma-related avoidable admissions declined from CY 2002 to CY 2004.³

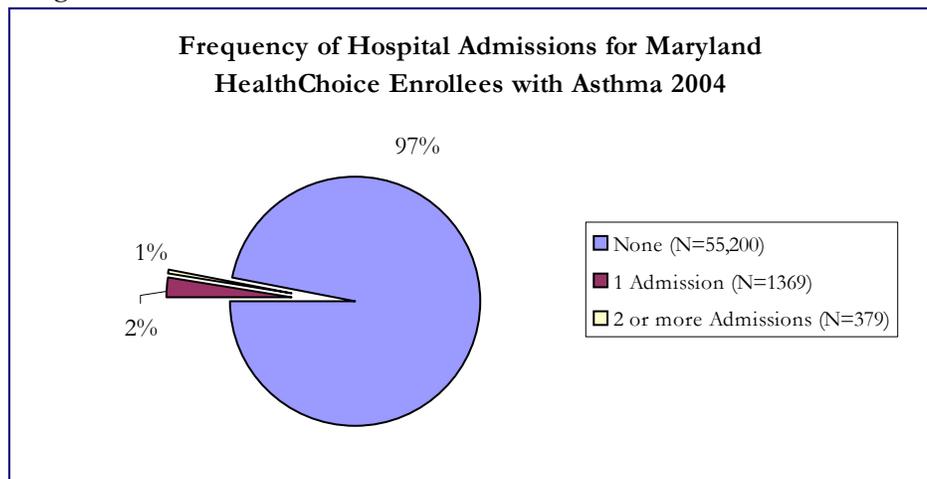
Few HealthChoice enrollees defined as having asthma had a hospitalization for asthma in 2004 (Figure 5-7). However, 2% were hospitalized once, and 1% had two or more hospitalizations.

Figure 5-6



Source: Maryland Medicaid

Figure 5-7



Source: Maryland Medicaid

³2006 HealthChoice Evaluation. Available at: http://www.dhmd.state.md.us/mma/healthchoice/pdf/FINAL_HCEval2006.pdf

DEATHS

Mortality from asthma is potentially preventable. Therefore, to some extent, trends in asthma mortality reflect the state's overall success in the management and control of asthma. The Maryland Asthma Control Program tracks asthma mortality by using data from the Maryland Vital Statistics Administration. These data included deaths of Maryland residents that occurred in Maryland. Data from 2002-2004 also include out-of-state deaths of Maryland residents. Mortality rates have been age-adjusted to the 2000 U.S. estimated population.

In 2004, 91 Maryland residents died from asthma as the underlying cause of death. Asthma contributed to the death of an additional 123 Maryland residents. Because of the small numbers of deaths each year, five-year averages present a more stable picture of trends in asthma mortality. Mortality has remained within about the same range over the past 5 years. From 2000-2004, an average of 86 Maryland residents died each year from asthma as an underlying cause (Table 6-1), which is slightly higher than the 1999-2004 average of 84 deaths per year. Asthma was a contributing cause of death each year for an additional of 161 additional Maryland residents, on average. This rate is lower than the 1999-2003 annual average of 175 deaths per year. The age adjusted mortality rate for asthma as an underlying cause of death in 2004 was 16.4 deaths per 1,000,000 population (Figure 6-1). The average age adjusted mortality for 2000-2004 was 16.0 deaths per 1,000,000 population, slightly higher than the 1999-2003 rate of 15.9.

Maryland asthma mortality rates can be compared to national statistics through 2003. Mortality rates for the total state population have remained similar to national rates over time. Over the past five years there has been no specific trend in deaths by month or season of death.

Disparities in asthma mortality continue to exist, both in Maryland and nationally (Figures 6-2 and 6-3). Blacks continue to die at a three times higher rate than Whites. Women have nearly twice the mortality rate of men. Asthma mortality rates are highest in the elderly. However, while the 5-year average mortality for persons 65 years and older has been decreasing, the mortality rate for children age 0-4 years increased from 2.2 deaths per million children per year for 1999-2003 to 3.3 deaths per million children per year for 2000-2004 (Figure 6-4).

The Maryland Asthma Control program will continue to follow mortality rates to determine whether current trends in asthma mortality persist. Specific circumstances surrounding asthma deaths will also be followed to better identify and address the risk factors that may lead to fatal asthma events.

Continue —>

DEATHS - Continued**Table 6-1 Asthma Deaths Among Maryland Residents, 1986 to 2004**

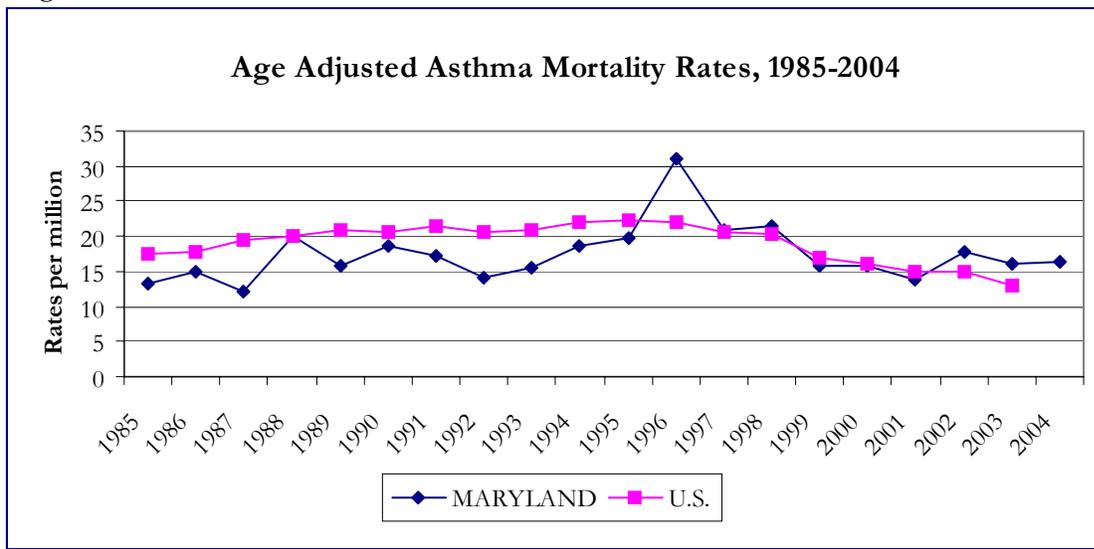
Year	Number of Deaths, Asthma as Underlying Cause	Number of Deaths, Asthma as Underlying or Contributing Cause
1985	53	N/A
1986	61	N/A
1987	50	N/A
1988	86	N/A
1989	70	N/A
1990	82	N/A
1991	76	N/A
1992	65	N/A
1993	73	186
1994	88	232
1995	95	239
1996	150	239
1997	103	241
1998	107	277
1999	81	278
2000	81	252
2001	74	260
2002	96	267
2003	87	239
2004	91	214

Data from Maryland Vital Statistics Administration

Continue —>

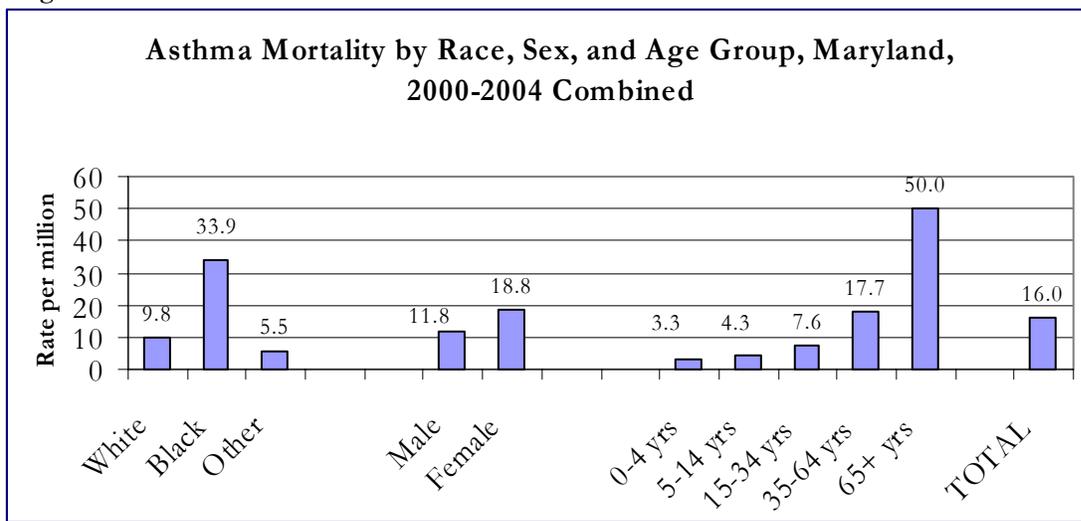
DEATHS - Continued

Figure 6-1



Maryland mortality data from Maryland Vital Statistics Administration
 U.S. data from CDC Wonder

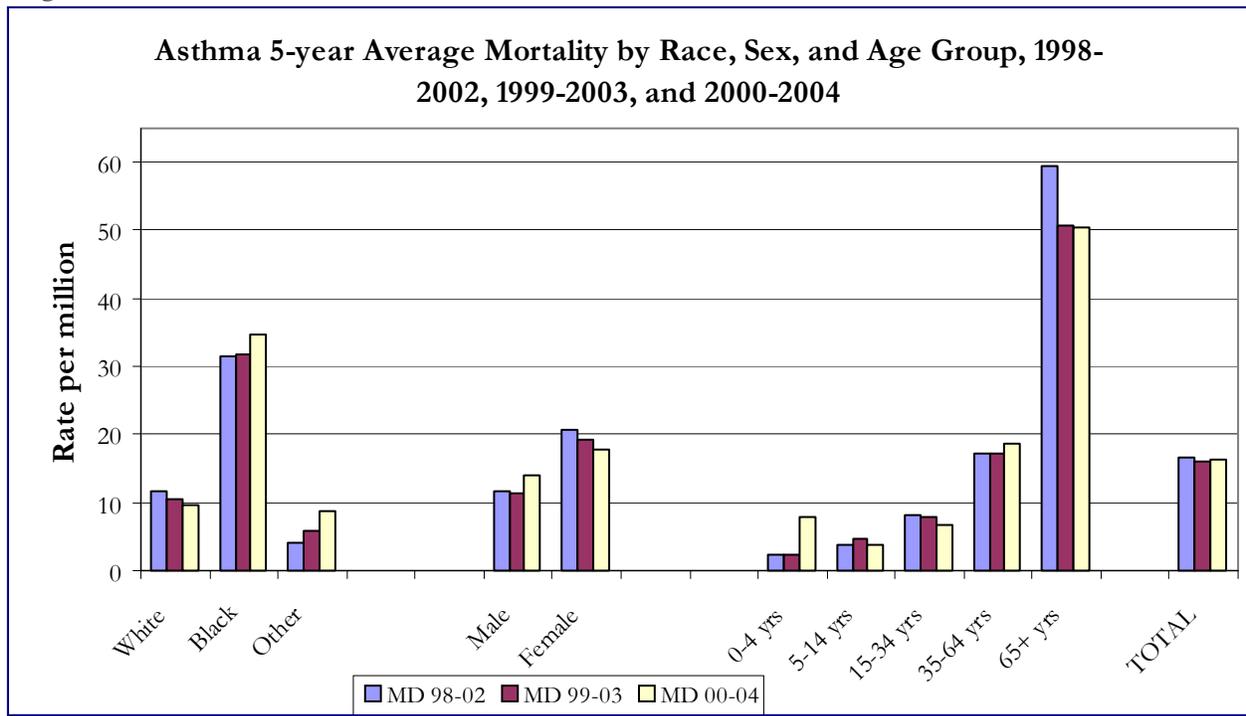
Figure 6-2



Continue —>

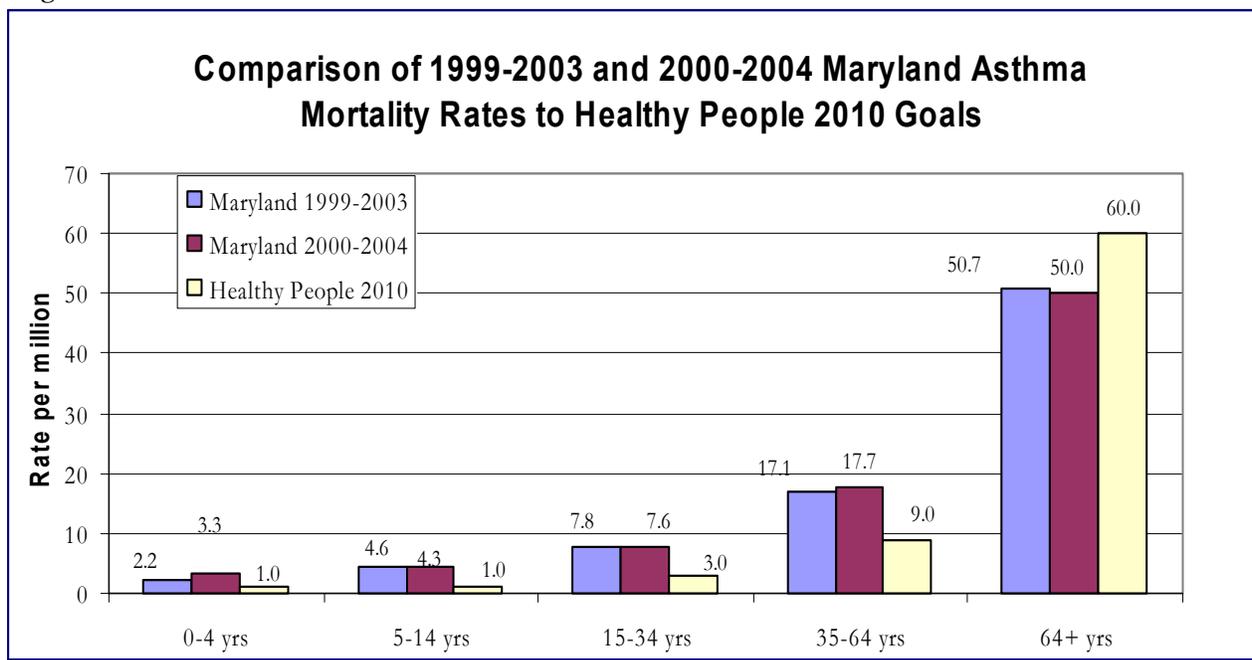
DEATHS - Continued

Figure 6-3



Maryland mortality data from Maryland Vital Statistics Administration
 U.S. data from CDC Wonder
 Total mortality rate, and rates by race and sex are age adjusted to the 2000 U.S. estimated population

Figure 6-4

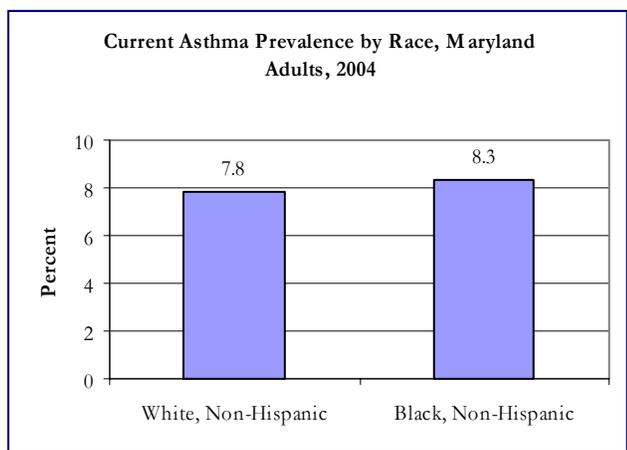


DISPARITIES AND ASTHMA

Data from the previous sections demonstrates many disparities in asthma morbidity and mortality. For example, among Maryland adults, African-Americans have a higher asthma prevalence than Whites, and women are more likely to have asthma than men. In addition, asthma prevalence increases with lower income and less education. Disparities are also seen when examining hospitalization and emergency department visit rates. When looking at Maryland residents of all ages, African-Americans have much higher hospitalization and emergency department visit rates than Whites (referred to as Black, Non-Hispanic in Figures). Young children (under 5 years of age) have disproportionate numbers of hospitalizations and emergency department visits compared to older asthmatics. African-Americans have higher asthma mortality rates than Whites.

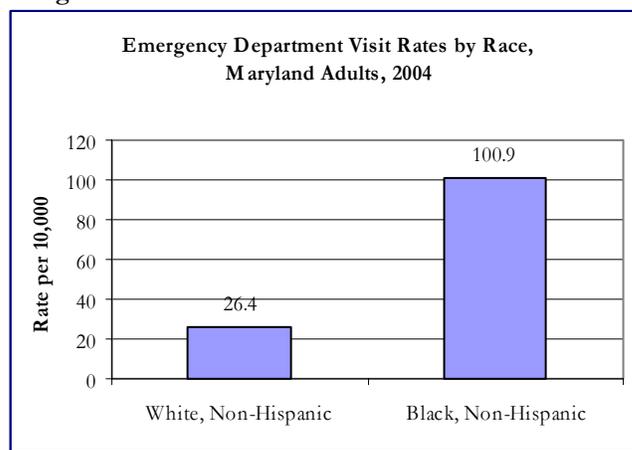
For some groups, increased hospitalization, emergency department visit, and mortality rates may be a direct result of the increased prevalence of asthma in those groups. For example, if one group had twice the prevalence of asthma, that group might be expected to also have twice the rate of hospitalizations, emergency department visits, and deaths. In order to examine whether increased prevalence of asthma among African-Americans could explain the higher morbidity and mortality, the “disparity ratio;” the ratio of African-American to Whites for each measure, was examined. Figures 7-1 through 7-4 provide the rates for African-Americans and Whites.

Figure 7-1



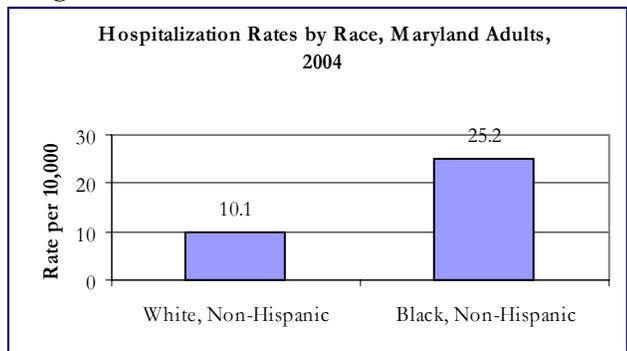
BRFSS data for Maryland adults

Figure 7-2



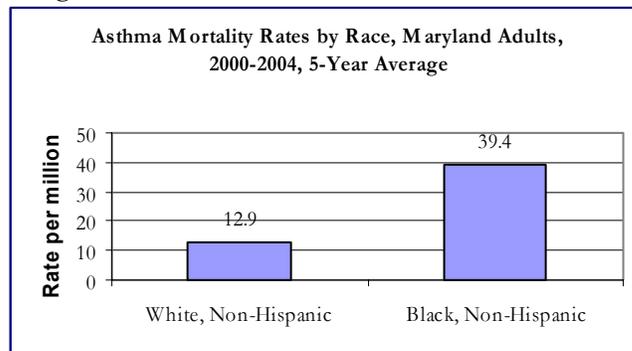
HSCRC data for Maryland adults ≥18 years. Age adjusted to 2000 U.S. estimated population

Figure 7-3



HSCRC data for Maryland adults ≥18 years. Age adjusted to 2000 U.S. estimated population

Figure 7-4



Data from Maryland Vital Statistics Administration for Maryland adults ≥ 18 years. Age adjusted to 2000 U.S. estimated population

Continue —>

DISPARITIES AND ASTHMA - Continued

African-American adults in Maryland had a 1.1 times higher asthma prevalence than White adults (8.3% vs. 7.8%, Figure 7-1). However, they had a 3.8 times higher rate of emergency department visits (100.9 vs. 26.4 visits per 10,000, Figure 7-2), a 2.5 times higher hospitalization rate (25.2 vs. 10.1 hospitalizations per 10,000, Figure 7-3), and a 3.1 times higher mortality rate (39.4 vs. 12.9 deaths per million, Figure 7-4). The differences in hospitalization, ED visit, and mortality rates between Whites and African-Americans are all statistically significant. Disparity ratios from the above are presented in Figure 7-5. The increased asthma morbidity and mortality among African-Americans cannot be fully explained by higher prevalence. Other factors, such as higher asthma severity, poorer asthma control, and/or more limited access to health care may further explain these differences. Because of small sample sizes, it was not possible to conduct similar analyses for other minority groups.

Similar comparisons were made for women and men with asthma, because women consistently have higher prevalence, as well as higher hospitalization, emergency department visit, and mortality rates when compared to men. The higher prevalence of asthma among women might be explained by physiological differences such as smaller

airways or hormones, increased health care seeking among women, as well as higher smoking rates among men, leading more men to be diagnosed with chronic obstructive pulmonary disease rather than asthma. The prevalence of asthma among Maryland women is 1.7 times higher than that among men (9.7% vs. 5.6%, Figure 7-6). Similarly, women have a 1.6 times higher emergency department visit rate (59.5 vs. 37.7 visits per 10,000, Figure 7-7) and a 1.7 times higher mortality rate (24.6 vs. 14.5 deaths per million, Figure 7-8). Therefore, much of the difference in emergency department visit and mortality rates by sex can be explained by the difference in prevalence. Women have a 2.2 times higher hospitalization rate (19.6 vs. 8.8 hospitalizations per 10,000, Figure 7-9), however, this difference in rates is not statistically significant. The above disparity ratios are summarized in Figure 7-10.

Figure 7-5

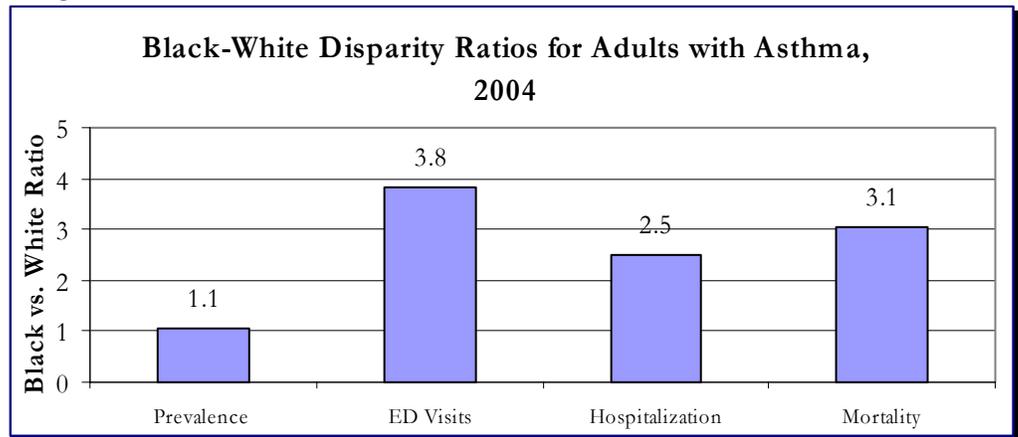
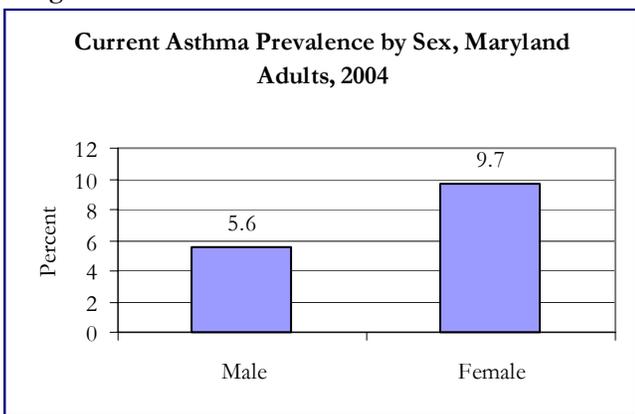


Figure 7-6



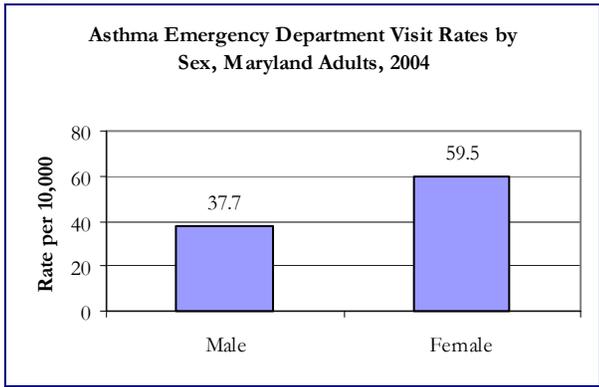
Data from BRFSS



Continue —>

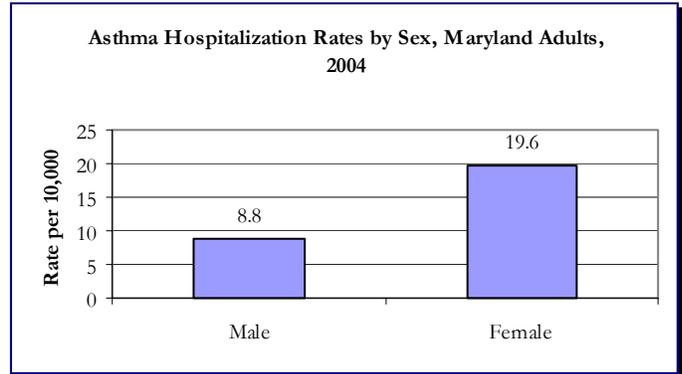
DISPARITIES AND ASTHMA - Continued

Figure 7-7



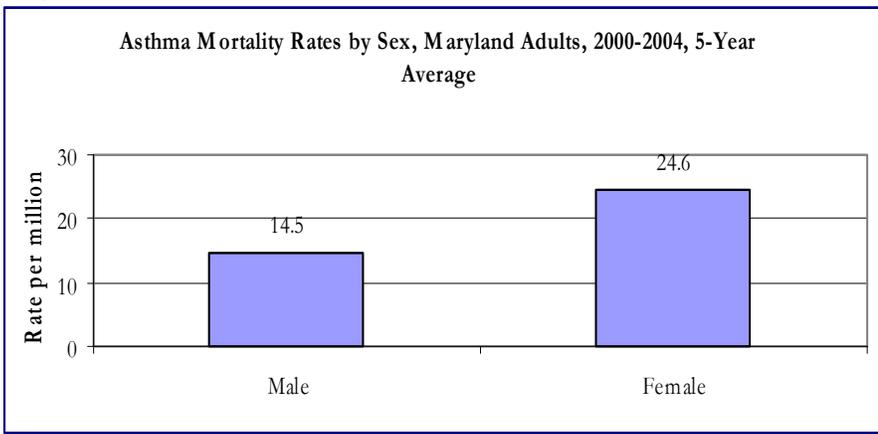
Data from HSCRC for adults ≥18 years.
Data has been age adjusted to the 2000 U.S. estimated population

Figure 7-8



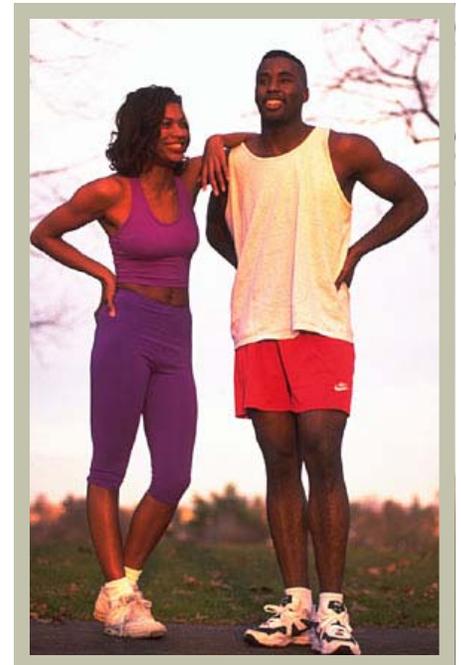
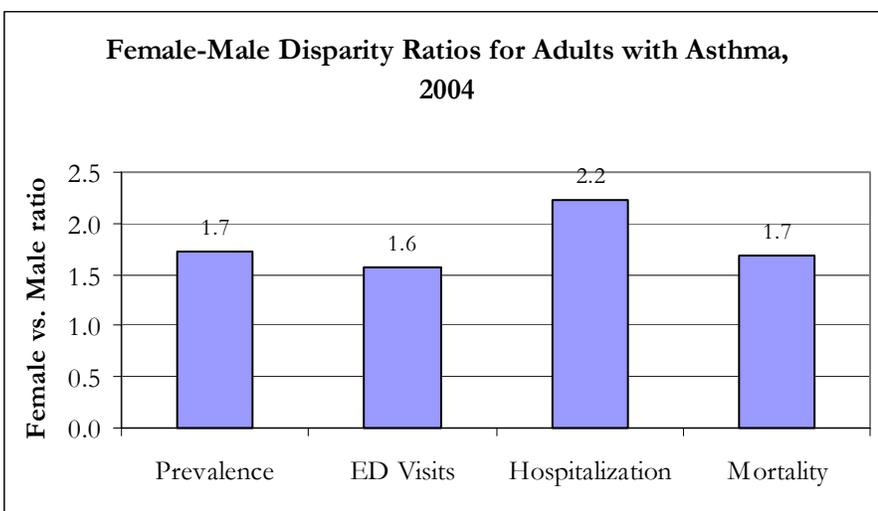
Data from HSCRC for adults ≥18 years.
Data has been age adjusted to the 2000 U.S. estimated population

Figure 7-9



Data from Maryland Vital Statistics Administration for Maryland adults ≥ 18 years

Figure 7-10



Continue —>

ASTHMA AMONG MARYLAND HISPANICS

Data regarding Maryland Hispanics with asthma is somewhat limited. Prevalence data is available from the Behavioral Risk Factor Surveillance System (BRFSS), however, the survey is only conducted in English in Maryland. Hospitalization data is available from the Health Services Cost Review Commission (HSCRC). However, the HSCRC does not collect data on ethnicity for emergency department visits.

The prevalence of asthma among Maryland adult Hispanics is lower than that of other racial and ethnic groups. Hospitalization rates for Maryland Hispanics are also lower than rates for other racial and ethnic groups. Differences in hospitalization rates between Hispanic and other racial and ethnic groups are larger for adults than children. Hospitalization rates for Hispanics in the Baltimore Metropolitan Area and the National Capital area are lower than the hospitalization rates for the population as a whole in those areas. However, hospitalization rates for Hispanics on the Eastern Shore are higher than for the population as a whole.

The national literature points to higher rates of asthma prevalence among persons of Puerto Rican decent. The Maryland Asthma Control Program plans to conduct focus groups with Hispanic families to determine their experiences with asthma. It is hoped these focus groups along with additional literature searches will help to shed light on prevalence among Hispanics.

Figure 8-1

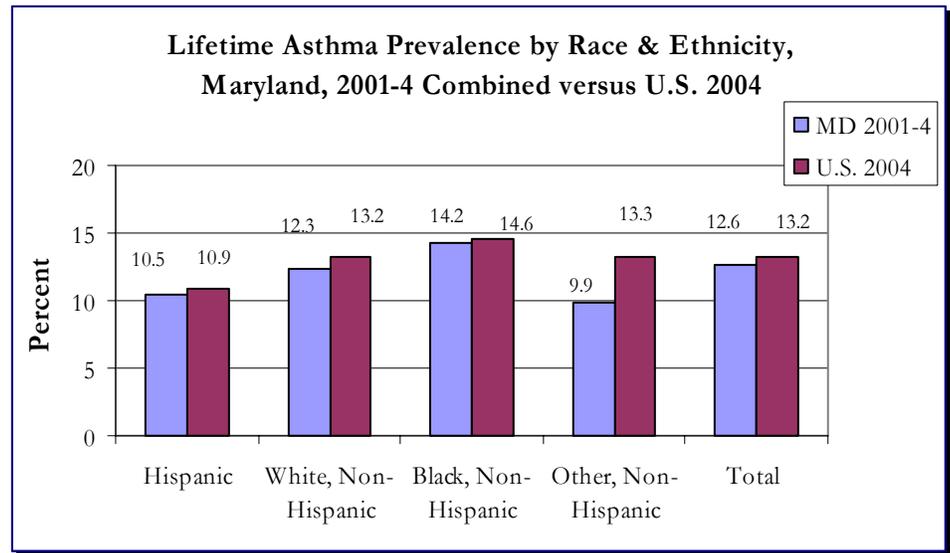
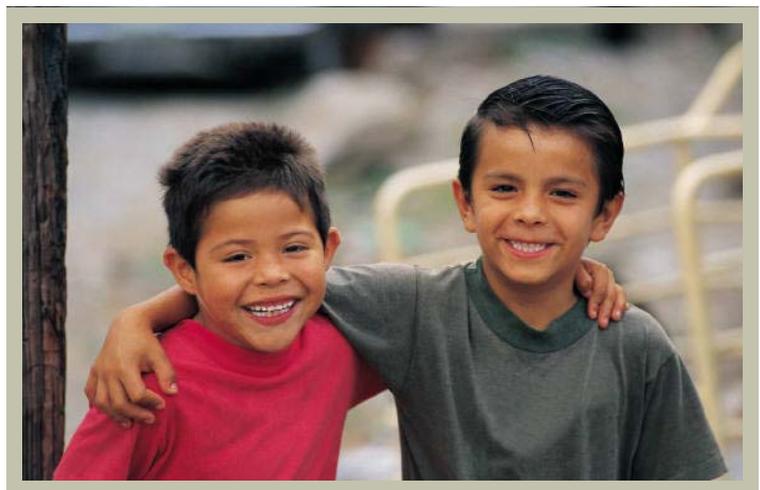
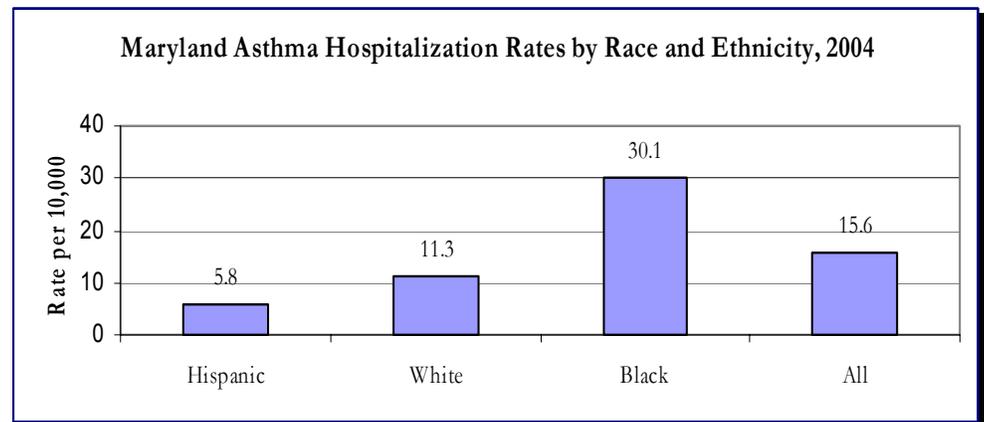


Figure 8-2



Continue —>

ASTHMA AMONG MARYLAND HISPANICS — Continued

Figure 8-3

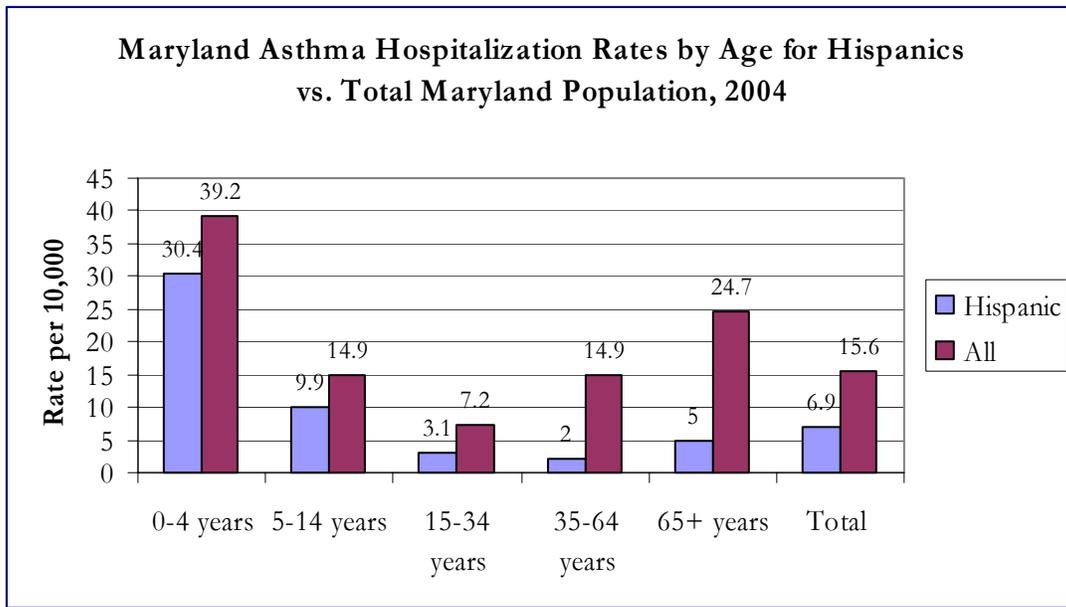
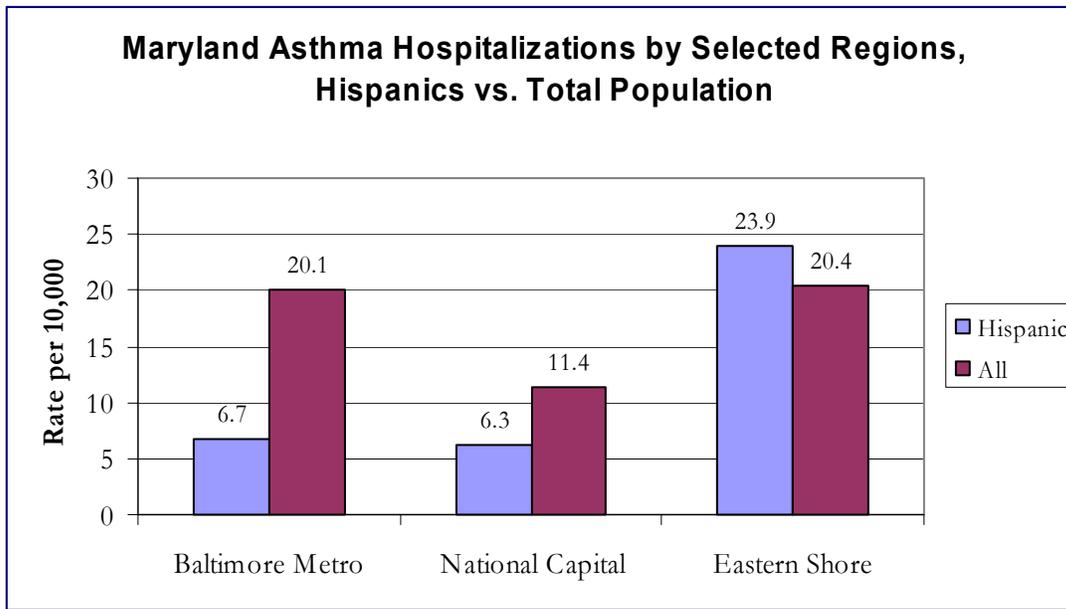


Figure 8-4



Notes:

Prevalence data is from combined 2001-2004 Behavioral Risk Factor Surveillance Surveys (BRFSS), and includes Maryland adults age 18 and over.

Hospitalization data does not include Maryland asthmatics hospitalized out of state.

Hospitalization data by ethnicity and region is age adjusted to the 2000 U.S. Census.

Continue —>

MARYLAND JURISDICTIONS AND ASTHMA

The burden of the prevalence, hospitalizations, emergency department visits, and deaths from asthma differs across the state. Baltimore City residents consistently have among the highest prevalence, emergency department visit, hospitalization, and death rates. While all Baltimore City rates are above the state average, other counties may have high rates in one category, but lower rates in others. This is because multiple factors such as differences in population risk, access to primary care, access to emergency care, and quality of care may affect emergency department visit, hospitalization, and death rates.

For prevalence data using the BRFSS, sample sizes for each jurisdiction are relatively small per year, but greater stability of the estimates is obtained when years are combined. As with previous Maryland Asthma Reports, three years of data, 2002-2004, have been combined in order to provide better estimates of prevalence. Because BRFSS prevalence data are estimates based on a sampling of the population, 95% confidence intervals have been provided to account for possible sampling error. For mortality rates, five years of jurisdiction-specific data have been combined, as the number of asthma deaths per year in each jurisdiction is small. Mortality data are presented for 2000-2004. Even when several years of data are combined, there may still be large changes in rates from last year's report for some small counties. Data may still be somewhat unstable because of the small number of deaths and the low number of BRFSS respondents in these smaller counties.

The numbers of hospitalizations and emergency department visits are much larger than those for prevalence and mortality. Therefore, data are presented for 2004 only. Hospitalization data includes numbers of Maryland residents hospitalized in neighboring states (Delaware, Pennsylvania, Virginia, and West Virginia) and the District of Columbia. Because last year's report also contained this data, trends in hospitalization numbers and rates between 2003 and 2004 can be made. Data were not collected on emergency department visits of Maryland residents in neighboring states. Therefore, emergency department visit rates may be underestimated, particularly for those jurisdictions that border other states.



For the following two tables (9-1 and 9-2):

Lifetime and Current Prevalence from BRFSS. Percentages are weighted to the 2004 Maryland population.

Emergency Department and Hospitalization data from HSCRC

Mortality data from Maryland Vital Statistics Administration. Five year average provided because of small numbers of deaths per year.

All rates are age adjusted to the 2000 U.S. estimated population.

*Total ED visits includes 7 persons with county of residence unknown.

*Total hospitalizations includes 15 persons with county of residence unknown.

Hospitalization data includes Maryland residents hospitalized in D.C., West Virginia, Pennsylvania, and Virginia.

**Rate significantly different from the State of Maryland rate ($p < 0.05$)

MARYLAND JURISDICTIONS AND ASTHMA - Continued

Table 9-1: Asthma Estimated Lifetime and Current Prevalence, 2002-2004, Three-year average. Emergency Department Visit and Hospitalization Rates, 2004. Average Mortality Rate 2000-2004. Data by Region and Jurisdiction

Jurisdiction	Lifetime Prevalence 2002-2004 Weighted Percent (95% CI)	Current Prevalence 2002-2004 Weighted Percent (95% CI)	ED Visits 2004 (Rate per 10,000)	Hospitalizations 2004 (Rate per 10,000)	Mortality 2000-2004 (Rate per 1,000,000)
NORTHWEST	13.7 (+/- 1.8)		46.3**	15.5	12.2**
Garrett	11.1 (+/- 6.1)	8.3 (+/- 4.8)	47.9**	9.5**	11.8**
Allegany	14.4 (+/- 4.3)	9.2 (+/- 3.4)	72	29.1**	5.4**
Washington	12.9 (+/- 3.1)	8.4 (+/- 2.2)	57.1	12.0**	16.3
Frederick	14.5 (+/- 2.8)	8.7 (+/- 2.3)	31.1**	13.7	12.6
BALTIMORE METRO	13.1 (+/- 1.3)		85.9**	20.2	19.0
Baltimore City	13.0 (+/- 2.6)	8.8 (+/- 2.1)	192.1**	40.8**	41.3**
Baltimore County	13.4 (+/- 2.1)	9.3 (+/- 1.8)	63.3	16.4	16.0
Anne Arundel	13.1 (+/- 2.5)	7.6 (+/- 1.9)	43.7**	11.5**	8.4**
Carroll	15.9 (+/- 4.6)	12.3 (+/- 3.9)	29.9**	14.6	14.6
Howard	10.1 (+/- 3.1)	4.6 (+/- 2.0)	50.1**	8.9**	10.3**
Harford	13.8 (+/- 3.9)	9.1 (+/- 2.9)	44.6**	14.0	5.0**
NATIONAL CAPITOL			45.4**	11.4**	13.3
Montgomery	11.2 (+/- 1.8)	6.8 (+/- 1.2)	35.9**	8.7**	10.8**
Prince George's	14.8 (+/- 2.4)	6.9 (+/- 1.8)	55.6	14.7	16.2
SOUTHERN MD	12.3 (+/- 2.2)		42.5**	13.0	20.9**
Calvert	13.2 (+/- 4.2)	10.3 (+/- 3.8)	47.1**	13.5	27.3**
Charles	13.2 (+/- 3.7)	8.9 (+/- 4.2)	39.9**	11.3**	14.6
Saint Mary's	10.1 (+/- 3.7)	6.3 (+/- 2.6)	42.1**	14.8	23.4**
EASTERN SHORE	12.2 (+/- 1.8)		62.8	21.4**	9.9**
Cecil	12.3 (+/- 4.0)	5.4 (+/- 2.4)	42.2**	30.8**	14.0
Kent	11.4 (+/- 8.4)	6.7 (+/- 6.6)	34.7**	30.6**	26.5**
Queen Anne's	10.4 (+/- 5.5)	7.4 (+/- 4.3)	32.3**	8.9**	4.0**
Caroline	16.3 (+/- 7.4)	10.4 (+/- 5.8)	64.7	32.7**	13.5
Talbot	11.1 (+/- 5.6)	6.6 (+/- 4.3)	72.4	20.7**	8.8**
Dorchester	7.8 (+/- 5.3)	6.3 (+/- 4.2)	83.2**	26.1**	6.0**
Wicomico	14.8 (+/- 4.2)	9.6 (+/- 3.4)	81.7**	16.7	9.0**
Somerset	18.7 (+/- 10.2)	16.7 (+/- 8.9)	111.6**	30.6**	15.1
Worcester	8.6 (+/- 4.1)	5.8 (+/- 3.9)	65.9	8.3**	2.5**
TOTAL	13.0 (+/- 0.7)	7.9 (+/- 0.6)	65.4	16.8	16.4

MARYLAND JURISDICTIONS AND ASTHMA - Continued

Table 9-2: Estimated Number of Residents with Lifetime and Current History of Asthma 2002-2004, Three-year Average. Total Number of Emergency Department Visits and Hospitalizations, 2004. Average Number of Deaths, 2000-2004. Data by Region and Jurisdiction.

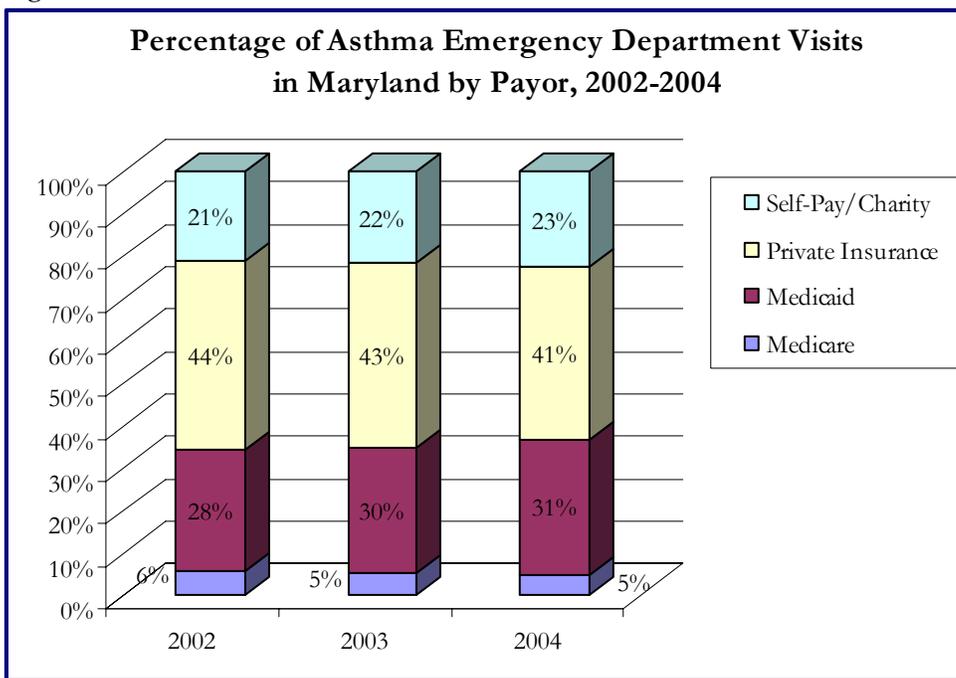
Jurisdiction	Number of Residents Who Ever Had Asthma Ave. 2002-04	Number of Residents Who Currently Have Asthma Ave. 2002-04	Number of Emergency Department Visits 2004	Number of Hospitalizations 2004	Average Number of Deaths per Year 2000-2004
NORTHWEST			2086	715	5.6
Garrett	2974	2189	134	28	<1
Allegany	8550	5460	493	238	<1
Washington	14,205	9243	778	165	2.4
Frederick	22,677	13,451	681	286	2.4
BALTIMORE METRO			21947	5251	48.4
Baltimore City	63,121	42,532	12259	2606	26.4
Baltimore County	78,293	54,422	4636	1280	13.2
Anne Arundel	50,878	29,520	2191	573	3.2
Carroll	19,442	14,966	483	237	2.2
Howard	20,102	9,069	1341	231	2.4
Harford	23,050	15,074	1037	324	1.0
NATIONAL CAPITOL			8110	1994	21.6
Montgomery	77,718	47,335	3272	805	9.4
Prince George's	86,412	39,909	4838	1189	12.2
SOUTHERN MD			1367	382	5
Calvert	8037	6269	404	110	1.8
Charles	12,151	8167	556	143	1.4
Saint Mary's	6584	4066	407	129	1.8
EASTERN SHORE			2553	883	4.4
Cecil	8195	3519	402	286	1.2
Kent	1668	981	63	56	<1
Queen Anne's	3041	2145	140	41	<1
Caroline	4172	2617	198	101	<1
Talbot	3167	1881	231	70	<1
Dorchester	1923	1562	230	79	<1
Wicomico	9306	5982	719	145	<1
Somerset	2426	2149	276	69	<1
Worcester	3439	2301	294	36	<1
TOTAL	531,531	324,812	36070*	9242*	85.8

COSTS OF ASTHMA

The financial burden of asthma in Maryland is substantial. While data is not available for all costs related to asthma care, the Health Services Cost Review Commission (HSCRC) does provide information about charges for asthma hospitalization and emergency department visits. The data below use charges as an estimate of the actual costs of asthma hospitalizations and emergency department visits. Total charges for asthma hospitalizations in 2004 were \$41,907,000. Emergency department visits accounted for an additional \$21,304,520. The average charge for an inpatient stay for asthma in 2004 was \$4,827. The average charge for an emergency department visit for asthma was \$590.

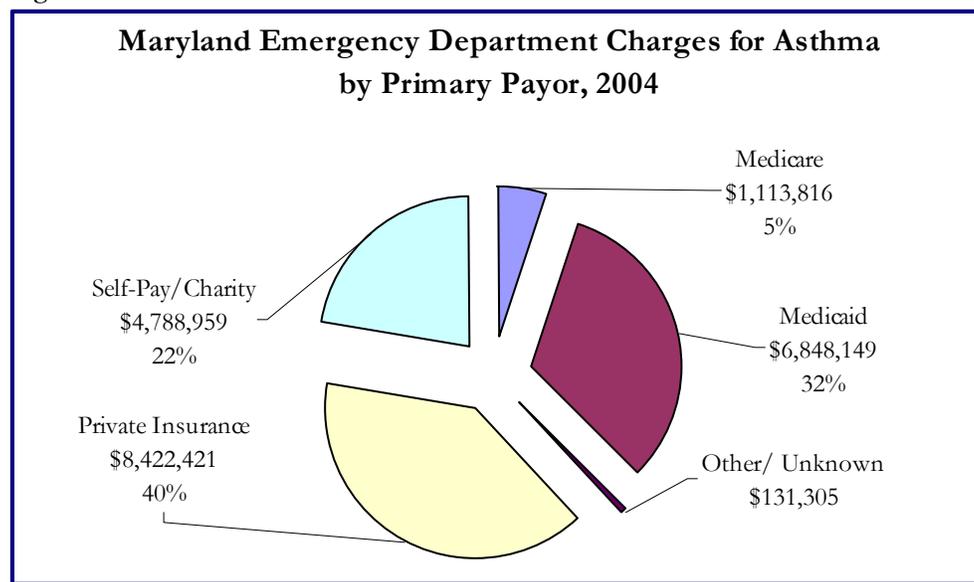
Between 2002 and 2004, there was a decline in the percentage of asthma hospitalizations and emergency department visits for patients with private insurance. A larger percentage of hospitalizations and emergency department visits were covered by public insurance, including Medicare and Medicaid. (Figures 10-1 and 10-4). Between 2002 and 2004, the percentage of asthma hospitalization and emergency department costs paid for by private insurance decreased, while the percentage covered by public insurance increased. (Figures 10-3 and 10-6).

Figure 10-1



Data from HSCRC
Data for persons with other or unknown insurance not shown, as they comprised <1% of visits

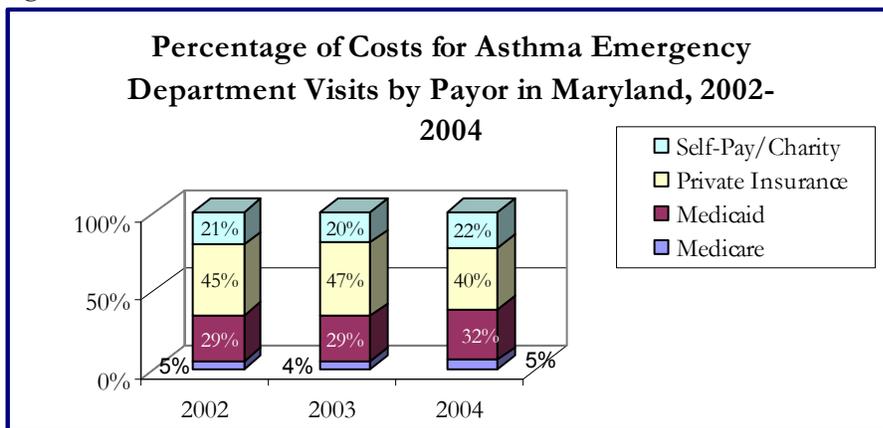
Figure 10-2



Data from HSCRC

COSTS OF ASTHMA - Continued

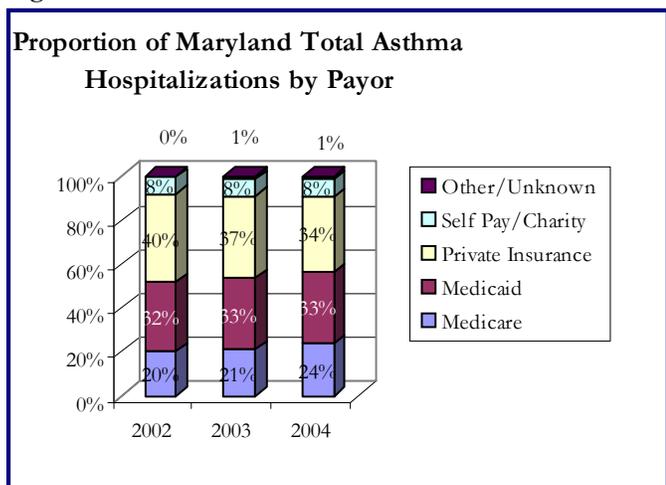
Figure 10-3



Data from HSCRC

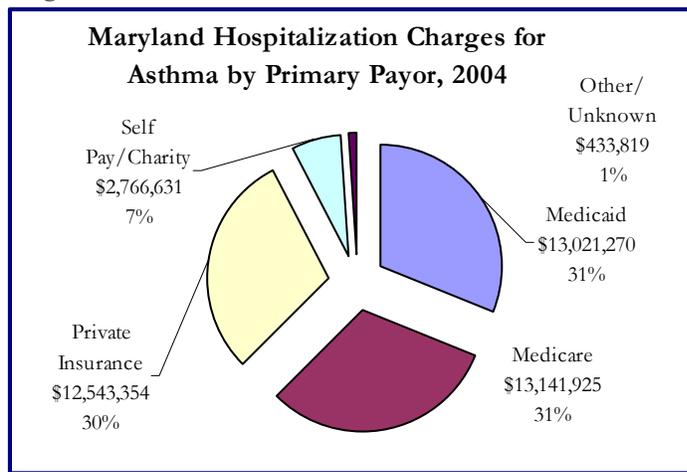
Data for persons with other or unknown insurance not shown, as they comprised <1% of costs

Figure 10-4



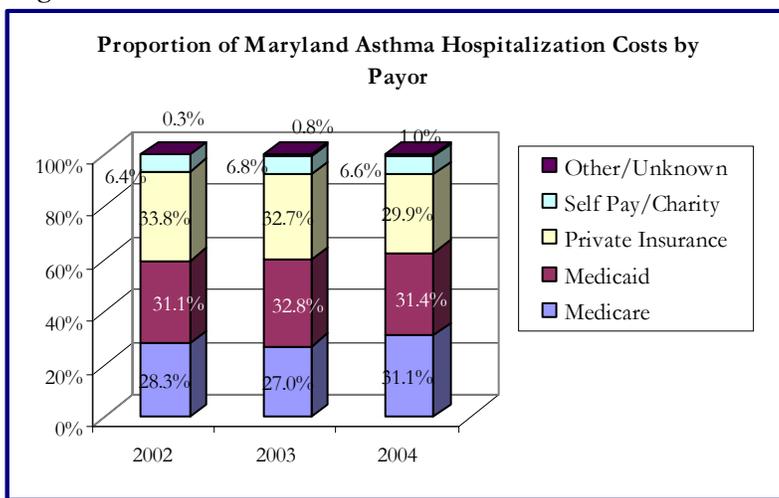
Data from HSCRC

Figure 10-5



Data from HSCRC

Figure 10-6



Data from HSCRC



CONCLUSIONS

This report confirms that asthma continues to be a major health problem in Maryland. An estimated 13.9% of Maryland adults and 10.2% of Maryland children have been diagnosed with asthma. An estimated 7.8% of adults and 7.6% of children in Maryland currently have asthma. These prevalence rates have been fairly stable over the past several years. Emergency department visit rates decreased for most groups, though they did increase slightly for African Americans. Similarly, hospitalization rates were decreased or stable for most groups, but also increased slightly for African Americans. Asthma prevalence, hospitalization rates, emergency department visit rates, and mortality rates still remain well above the Healthy People 2010 goals. As indicated in the chapters on disparities and on Medicaid enrollees, asthma and its complications continue to disproportionately affect the very young, the elderly, African-Americans, low-income individuals, and individuals in certain jurisdictions, particularly Baltimore City. The monetary cost of asthma hospitalizations and emergency department visits is substantial, and are increasingly borne by Medicare and Medicaid. Non-monetary costs such as lowered quality of life, disrupted sleep, and work absences are also significant. Additional tracking of asthma prevalence, morbidity and mortality is vital to improve understanding of individual and environmental factors that contribute. Information gleaned from analyzing the epidemiology of asthma is critical to planning, implementing, and evaluating activities aimed at reducing the personal and public health burden of asthma for Maryland residents. Because programs to reduce the burden of asthma take time to work, the effectiveness of asthma control programs, and reductions in the burden of asthma will be seen in the coming years and decades.



FUTURE DIRECTIONS

The Maryland Asthma Control Program expects to produce ongoing asthma surveillance reports. We anticipate continued expansion of data included in our annual report. We began to assess the burden of occupational asthma in Maryland in our 2004 report. We will have additional data on occupational asthma in next year's report, with the inclusion of the BRFSS Occupational Asthma Module to the 2005 BRFSS survey in Maryland. Additional data on asthma in children will also be obtained through the expanded BRFSS Childhood Asthma module to the 2005 BRFSS survey. As our Hispanic data is currently limited, additional sources of information on asthma among Maryland Hispanic residents will be sought. The Maryland Asthma Control Program is in the process of developing a workgroup that will assess other sources of asthma data, and ensure consistency and clarity of data presentation. Finally, we will continue our surveillance system evaluation in order to determine which components are effective, and which need improvement.

REFERENCES

Bloom B, Cohen RA, Vickerie JL, Wondimu EA. Summary health statistics for U.S. children: National Health Interview Survey, 2001. National Center for Health Statistics. *Vital Health Stat.* 10(216). 2003.

Centers for Disease Control and Prevention. Surveillance Summaries, March 29, 2002. *Morbidity and Mortality Weekly Report.* 2002;51(no. SS-1).

Division of Adult and Community Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System Online Prevalence Data, 1995-2004.

Division of Health Statistics, Maryland Vital Statistics Administration, Maryland Department of Health and Mental Hygiene. Maryland Vital Statistics Annual Report 2004. Online at: www.mdpublichealth.org/vsa/doc/04annual.pdf

Division of Health Statistics, Maryland Vital Statistics Administration, Maryland Department of Health and Mental Hygiene. Maryland Vital Statistics Annual Report 2003. Online at: www.mdpublichealth.org/vsa/doc/03annual.pdf

Division of Health Statistics, Maryland Vital Statistics Administration, Maryland Department of Health and Mental Hygiene. Maryland Vital Statistics Annual Report 2002. Online at: www.mdpublichealth.org/vsa/doc/02annual.pdf

Division of Health Statistics, Maryland Vital Statistics Administration, Maryland Department of Health and Mental Hygiene. Maryland Vital Statistics Annual Report 2001. Online at: www.mdpublichealth.org/vsa/doc/01annual.pdf

Division of Health Statistics, Maryland Vital Statistics Administration, Maryland Department of Health and Mental Hygiene. Maryland Vital Statistics Annual Report 2000. Online at: www.mdpublichealth.org/vsa/doc/00annual.pdf

Division of Health Statistics, Maryland Vital Statistics Administration, Maryland Department of Health and Mental Hygiene. Maryland Vital Statistics Annual Report 1999. Online at: www.mdpublichealth.org/vsa/doc/99annual.pdf

Division of Health Statistics, Maryland Vital Statistics Administration, Maryland Department of Health and Mental Hygiene. Maryland Vital Statistics Annual Report 1998. Online at: www.mdpublichealth.org/vsa/doc/98annual.pdf

Expert Panel Report 2: guidelines for the diagnosis and management of asthma. Bethesda (MD):U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Heart, Lung, and Blood Institute; 1997.

Hall MJ, DeFrances CJ. 2001 National Hospital Discharge Survey. Advance data from vital and health statistics; no 332. Hyattsville, Maryland: National Center for Health Statistics. 2003.

Continue —>

REFERENCES - Continued

Klein RJ, Schoenborn CA. Age adjustment using the 2000 projected U.S. population. *Healthy People Statistical Notes*, no. 20. Hyattsville, Maryland: National Center for Health Statistics. January 2001.

National Asthma Education and Prevention Program Expert Panel Report: guidelines for the diagnosis and management of asthma update on selected topics-2002. *J Allergy Clin Immunol.* 2002;110(5 pt 2):S141-219.

National Center for Health Statistics. Asthma Prevalence, Health Care Use, and Mortality, 2000-2001. Online at: www.cdc.gov/nchs/products/pubs/pubd/hestats/asthma.htm. Last reviewed 1/28/03. Accessed 10/17/03.

U.S. Department of Health and Human Services. Centers for Disease Control and Prevention, National Center for Health Statistics, Office of Analysis and Epidemiology, Compressed Mortality File compiled from CMF 1968-1988, Series 20, No. 2A 2003, CMF 1989-98, Series 20, No. 2E 2003, and CMF 1999-2000, Series 20, No. 2F 2003 on CDC Wonder On-line database. Query date 10/17/03.

U.S. Department of Health and Human Services. *Healthy People 2010*. 2nd ed. With Understanding and Improving Health and Objectives for Improving Health. 2 vols. Washington, DC: U.S. Government Printing Office, November 2000.

2005 HealthChoice Evaluation. Available at:
<http://www.dhmh.state.md.us/mma/pdf/HC%20Eval%20Final%202005.pdf>

2006 HealthChoice Evaluation. Available at:
http://www.dhmh.state.md.us/mma/healthchoice/pdf/FINAL_HCEval2006.pdf

Appendix – 95% Confidence Intervals for BRFSS Data

The information in each title refers to the corresponding figure in the text.

Figure 1-1: Asthma Lifetime Prevalence for Adults, Maryland vs. United States, BRFSS 2001-2004

Year	Maryland Prevalence (95% Confidence Interval)	U.S. Prevalence (95% CI)
2001	11.1% (10% - 12.2%)	
2002	12.7% (11.5%-13.9%)	
2003	11.9% (10.7%-13.1%)	12% (11.8%-12.2%)
2004	13.9% (12.7%-15.2%)	13.3% (13.1%-13.6%)

Figure 1-2: Asthma Current Prevalence for Adults, Maryland vs. United States, BRFSS 2001-2004

Year	Maryland Prevalence (95% CI)	U.S. Prevalence (95% CI)
2001	7.1% (6.2%-8.0%)	7.2% (7.1%-7.3%)
2002	8.2% (7.2%-9.2%)	7.5% (7.4%-7.6%)
2003	7.8% (6.8%-8.8%)	7.7% (7.6% - 7.8%)
2004	7.8% (6.7%-8.8%)	8.1% (7.9%-8.3%)

Figure 1-3: Age at Initial Asthma Diagnosis for Adults, BRFSS 2003-4 Combined (Raw sample size = 320)

Age	Percent Diagnosed at that Age (95% CI)
<10 years	36.7% (33.1%-40.3%)
11-17 years	18.0% (15.1%-20.9%)
18-34 years	19.5% (16.5%- 22.5%)
35-44 years	11.4% (9.0%-13.8%)
45-54 years	7.0% (5.1%-8.9%)
55-64 years	4.5% (2.9%-6.1%)
65+ years	2.8% (1.6%-4.0%)

Continue —>

Appendix – 95% Confidence Intervals for BRFSS Data - Continued

**Figure 1-4: Asthma Lifetime Prevalence by Race/Ethnicity
BRFSS Maryland Adults 2002-2004 (Raw sample size = 1,643)**

Race/Ethnicity	Prevalence (95% CI)
White, Non-Hispanic	12.7% (11.9%-13.5%)
Black, Non-Hispanic	14.3% (12.5%-16.1%)
Hispanic	12.0% (7.9%-16.1%)
Other, Non-Hispanic	10.6% (7.3%-14.0%)
Multi-race, Non-Hispanic	16.1% (7.4%-24.8%)

**Figure 1-5: Asthma Lifetime Prevalence by Gender
BRFSS Maryland Adults 2002-2004 (Raw sample size = 1,669)**

Gender	Prevalence (95% CI)
Male	10.9% (9.9%-11.9%)
Female	14.8% (13.9%-15.8%)

**Figure 1-6: Asthma Lifetime Prevalence by Age
BRFSS Maryland Adults 2002-2004 (Raw sample size = 1,643)**

Age	Prevalence (95% CI)
18-24 years	19.3% (15.9%-22.7%)
25-34 years	14.5% (12.6%-16.4%)
35-44 years	11.6% (10.2%-13.0%)
45-54 years	12.5% (11.0%-14.0%)
55-64 years	10.9% (9.3%-12.5%)
65-74 years	11.5% (9.4%-13.6%)
75+ years	9.6% (7.4%-11.8%)

Continue —>

Appendix – 95% Confidence Intervals for BRFSS Data - Continued

**Figure 1-7: Asthma Lifetime Prevalence by Education
BRFSS Maryland Adults 2002-2004 (Raw sample size = 1,665)**

Education Level	Prevalence (95% CI)
Less than High School Graduate	14.6% (11.7%-17.5%)
High School Graduate/GED	12.9% (11.6%-14.2%)
Some College/Technical School	14.4% (12.9%-15.9%)
College Graduate	11.9% (10.9%-13.0%)

**Figure 1-8: Asthma Lifetime Prevalence by Income
BRFSS Maryland 2002-2004 (Raw sample size = 1,493)**

Income	Prevalence (95% CI)
<\$15,000	16.8% (13.6%-20.0%)
\$15,000-\$24,999	15.4% (13.1%-17.7%)
\$25,000-\$49,999	13.3% (11.8%-14.8%)
\$50,000-\$74,999	11.5% (9.9%-13.1%)
>=\$75,000	12.2% (11.0%-13.4%)

**Figure 1-9: Asthma Prevalence Among Maryland Adult Smokers
BRFSS 2002-2004 (Raw sample size = 13,171)**

Smoking Category	% With Current Asthma (95% CI)	% With Past Asthma (95% CI)	% Never Had Asthma (95% CI)
Current Smoker-Daily	7.8% (6.4%-9.2%)	5.2% (4.0%-6.4%)	87.0% (85.2%-88.8%)
Current Smoker-Some	10.4% (7.4%-13.4%)	5.2% (3.0%-7.4%)	84.4% (80.9%-87.9%)
Former Smoker	7.6% (6.5%-8.7%)	4.8% (3.9%-5.7%)	87.6% (86.3%-88.9%)
Never Smoked	8.0% (7.4%-8.6%)	4.4% (3.8%-5.0%)	87.6% (86.7%-88.5%)

**Figure 1-10: Smoking Prevalence Among Maryland Adult Asthmatics
BRFSS 2002-2004 (Raw sample size = 13,171)**

Asthma Status	% Current Daily Smokers	% Current Smokers- Some Days	% Former Smokers	% Never Smoked
Current Asthma	15% (12.4%-17.6%)	6.8% (5.0%-8.6%)	22.2% (19.2%-25.2%)	56.0% (52.4%-59.6%)
Past Asthma	17.1% (13.2%-21.0%)	5.8% (3.4%-8.2%)	24.2% (19.8%-26.6%)	52.9% (47.8%-58.0%)
Never Had Asthma	15.3% (14.5%-16.1%)	5.0% (4.5%-5.5%)	23.5% (22.6%-24.4%)	56.2% (55.1%-57.3%)

Appendix – 95% Confidence Intervals for BRFSS Data - Continued

Figure 2-1: Frequency of Asthma Symptoms in the Past Month, Maryland Adults With Asthma BRFSS 2003-4 (Raw sample size = 650)

Frequency of Symptoms	Percent of Respondents (95% CI)
Less than once a week	23.1% (19.1%-27.1%)
1-2 times per week	15.3% (11.9%-18.7%)
2+ times per week, not every day	8.8% (6.1%-11.5%)
Every day, not all the time	12.0% (8.9%-15.1%)
Every day, all the time	4.4% (2.5%-6.3%)
Not at any time	36.5% (32.0%-41.0%)

Figure 2-2: Number of Nights with Asthma-related Sleeping Difficulty in the Past Month, Maryland Adults with Asthma BRFSS 2003-4 (Raw sample size = 441)

Number of Nights	Percent of Respondents (95% CI)
1-2	19.9% (15.3%-24.5%)
3-4	8.5% (5.3%-11.7%)
5	2.0% (0.4%-3.6%)
6-10	5.0% (2.5%-7.5%)
>10	7.8% (4.7%-10.9%)
None	55.0% (48.2%-61.8%)

Figure 2-3: Frequency of Prescribed Asthma Medication Use in the Past Month For Maryland Adults with Asthma BRFSS 2003-4 (Raw sample size = 650)

Frequency of Medication Use	Percent of Respondents (95% CI)
< One time per week	9.8% (7.0%-12.6%)
1-2 times per week	9.6% (6.8%-12.4%)
2 times per week, not every day	4.6% (2.6%-6.6%)
One time per day	17.5% (13.9%-21.1%)
>= 2 times per day	18.8% (15.1%-22.5%)
None	39.8% (35.2%-44.4%)

Figure 2-4: Number of Days Asthma Interfered with Work or Usual Activities In the Past Year, Maryland Adults with Asthma BRFSS 2003 (Raw sample size = 654)

Number of Days	Percent of Respondents (95%CI)
1-2	7.0% (4.6%-9.4%)
3-7	8.6% (6.0%-11.2%)
8-29	4.7% (2.7%-6.7%)
>=30	11.9% (8.9%-14.9%)
None	67.8% (63.4%-72.2%)

Appendix – 95% Confidence Intervals for BRFSS Data - Continued

**Figure 2-5: Health Status of Persons who Currently Have Asthma vs. Persons Who Do Not
BRFSS 2002-4 (Raw sample size = 13,179)**

Health Status	Percent With Asthma (95% CI)	Percent Without Asthma (95% CI)
Excellent/Very Good	42.4% (41.1%-43.7%)	61.7% (58.8%-64.6%)
Fair/Poor	25.0% (23.8%-26.2%)	10.7% (8.9%-12.5%)

Note: BRFSS includes 5 categories, Excellent, Very Good, Good, Fair, and Poor. For this comparison, we did not show the “Good” group, and we combined Excellent with Very Good, and Fair with Poor.

**Figure 2-6: Number of Routine Asthma Check-Ups in Past Year for Maryland Adults with Asthma
BRFSS 2002-4 (Raw sample size = 666)**

Number of Check-Ups	Percent of Respondents (95% CI)
One	29.3% (25.1%-33.5%)
Two	11.0% (8.1%-13.9%)
Three or More	15.4% (12.0%-18.8%)
None	44.3% (39.7%-48.9%)

**Figure 2-7: Number of Doctor Visits In the Past Year for Urgent or Worsening Asthma Symptoms, Maryland Adults with Asthma
BRFSS 2003-4 (Raw sample size = 664)**

Number of Doctor Visits	Percent of Respondents (95% CI)
One	11.1% (8.2%-14.0%)
Two or More	13.5% (10.3%-16.7%)
None	75.4% (71.4%-79.4%)

Appendix – 95% Confidence Intervals for BRFSS Data - Continued

Figure 2-8: Percentage of Maryland Adults with Illness in the Past Year that may have been Caused by Outdoor Air Pollution
BRFSS 2004 (Raw sample size = 564)

	Illness in the Past Year Caused by Outdoor Air Pollution	
	% YES (95% CI)	% NO (95% CI)
Current Asthma	31.1% (25.2%-37.0%)	68.9% (63.0%-74.8%)
No Current Asthma	17.4% (11.1%-23.7%)	82.6% (76.3%-88.9%)

Figure 2-9: Percentage of Maryland Adults with Illness in the Past Year that may have been Caused by Indoor Air Pollution
BRFSS 2004 (Raw sample size = 570)

	Illness in the Past Year Caused by Indoor Air Pollution	
	% YES (95% CI)	% NO (95% CI)
Current Asthma	45.8% (39.5%-52.1%)	54.2% (47.9%-60.5%)
No Current Asthma	32.5% (24.7%-40.3%)	67.5% (59.7%-75.3%)

Figure 2-10: Percentage of Maryland Adults Receiving Influenza Immunization by Asthma Diagnosis

	Flu Shot in the Past Year	
	% YES (95% CI)	% NO (95% CI)
Current Asthma	45.5% (39.3%-51.8%)	54.5% (48.3%-60.8%)
No Current Asthma	33.1% (31.3%-34.9%)	66.9% (65.1%-68.7%)

Appendix – 95% Confidence Intervals for BRFSS Data - Continued

Figure 8-1: Raw Sample Sizes for Asthma Lifetime and Current Prevalence by County, BRFSS 2002-4

Jurisdiction	Sample Size	Lifetime Prevalence 2002-2004 Weighted Percent (95% CI)	Current Prevalence 2002- 2004 Weighted Percent (95% CI)
NORTHWEST	277	13.7 (+/- 1.8)	
Garrett	17	11.1 (+/- 6.1)	8.3 (+/- 4.8)
Allegany	58	14.4 (+/- 4.3)	9.2 (+/- 3.4)
Washington	84	12.9 (+/- 3.1)	8.4 (+/- 2.2)
Frederick	118	14.5 (+/- 2.8)	8.7 (+/- 2.3)
BALTIMORE METRO	481	13.1 (+/- 1.3)	
Baltimore City	126	13.0 (+/- 2.6)	8.8 (+/- 2.1)
Baltimore County	193	13.4 (+/- 2.1)	9.3 (+/- 1.8)
Anne Arundel	126	13.1 (+/- 2.5)	7.6 (+/- 1.9)
Carroll	55	15.9 (+/- 4.6)	12.3 (+/- 3.9)
Howard	50	10.1 (+/- 3.1)	4.6 (+/- 2.0)
Harford	57	13.8 (+/- 3.9)	9.1 (+/- 2.9)
NATIONAL CAPITOL			
Montgomery	225	11.2 (+/- 1.8)	6.8 (+/- 1.2)
Prince George's	176	14.8 (+/- 2.4)	6.9 (+/- 1.8)
SOUTHERN MD	151	12.3 (+/- 2.2)	
Calvert	52	13.2 (+/- 4.2)	10.3 (+/- 3.8)
Charles	56	13.2 (+/- 3.7)	8.9 (+/- 4.2)
Saint Mary's	43	10.1 (+/- 3.7)	6.3 (+/- 2.6)
EASTERN SHORE	233	12.2 (+/- 1.8)	
Cecil	47	12.3 (+/- 4.0)	5.4 (+/- 2.4)
Kent	9	11.4 (+/- 8.4)	6.7 (+/- 6.6)
Queen Anne's	16	10.4 (+/- 5.5)	7.4 (+/- 4.3)
Caroline	24	16.3 (+/- 7.4)	10.4 (+/- 5.8)
Talbot	22	11.1 (+/- 5.6)	6.6 (+/- 4.3)
Dorchester	12	7.8 (+/- 5.3)	6.3 (+/- 4.2)
Wicomico	63	14.8 (+/- 4.2)	9.6 (+/- 3.4)
Somerset	15	18.7 (+/- 10.2)	16.7 (+/- 8.9)
Worcester	25	8.6 (+/- 4.1)	5.8 (+/- 3.9)
TOTAL	1,669	13.0 (+/- 0.7)	7.9 (+/- 0.6)



Martin O'Malley, Governor
Anthony G. Brown, Lieutenant Governor
John M. Colmers, Secretary, DHMH

The services and facilities of the Maryland Department of Health and Mental Hygiene (DHMH) are operated on a non-discriminatory basis. This policy prohibits discrimination on the basis of race, color, sex, or national origin and applies to the provisions of employment and granting of advantages, privileges and accommodations.

The Department, in compliance with the Americans With Disabilities Act, ensures that qualified individuals with disabilities are given an opportunity to participate in and benefit from DHMH services, programs, benefits and employment opportunities.

Produced by the Maryland Asthma Control Program
Family Health Administration
410-767-6713

This publication was supported by Cooperative Agreement Number U59/CCU324212-01 from the Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of CDC.

February 2007

